

1995 Status Report



EXXON

VALDEZ

OIL SPILL

FRUSTEE

COUNCIL



MISSION STATEMENT OF THE EXXON VALDEZ OIL SPILL TRUSTEE COUNCIL

The mission of the Trustee Council and all participants in council efforts is to efficiently restore the environment injured by the *Exxon Valdez* oil spill to a healthy, productive world renowned ecosystem, while taking into account the importance of quality of life and the need for viable opportunities to establish and sustain a reasonable standard of living.

The restoration will be accomplished through the development and implementation of a comprehensive interdisciplinary recovery and rehabilitation program that includes:

- Natural Recovery
- Monitoring and Research
- Resource and Service Restoration
- Habitat Acquisition and Protection
- Resource and Service Enhancement
- Replacement
- Meaningful Public Participation
- Project Evaluation
- Fiscal Accountability
- Efficient Administration

Adopted by the Trustee Council, November 30, 1993.



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From the
Executive
Director

Significant progress has been made in the last year towards achieving the mission of the Trustee Council "to efficiently restore the environment injured by the Exxon Valdez oil spill to a healthy, productive world renowned ecosystem, while taking into account the importance of quality of life and the need for viable opportunities to establish and sustain a reasonable standard of living."

The Council's adoption in November 1994 of a Restoration Plan was a major achievement as well as the culmination of several years of effort involving thousands of people in communities throughout the spill-affected region and across the nation. With the plan, we now have in place the framework and policy guidance for a comprehensive, balanced approach to restoration.

Research and monitoring continue to be major elements of that balanced approach. In fact, the knowledge gained through these studies may be one of the most valuable legacies of the spill. These

Exxon Valdez Oil Spill Trustee Council



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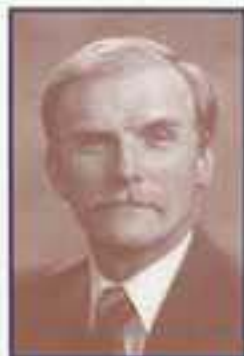
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EXXON VALDEZ OIL SPILL TRUSTEE COUNCIL PUBLIC ADVISORY GROUP 1995 - 1997

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STATUS OF THE RESTORATION PROGRAM

Six years have passed since the supertanker *Exxon Valdez* spilled almost eleven million gallons of oil into the waters of Prince William Sound. In the weeks after the March 24, 1989 tanker grounding, oil followed the prevailing ocean currents and fouled more than 1,500 miles of Alaska shoreline. Major oiling occurred on shorelines in Prince William Sound, on the Kenai Peninsula, Kodiak Island, the Gulf of Alaska and along the Alaska Peninsula.

During the first three years after the spill, state and federal resource agencies assessed injuries to the natural resources of the spill area. The settlement of civil claims between the state and federal governments and Exxon Corporation in October 1991 resulted in an unprecedented award of \$900 million and formation of the *Exxon Valdez* Oil Spill Trustee Council.

The Trustee Council consists of three state and three federal trustees. The Memorandum of Agreement which governs Trustee Council actions states that they are responsible for overseeing expenditures from the settlement funds "...for the purposes of restoring, replacing, enhancing, or acquiring the equivalent of natural resources injured as a result of the oil spill and the reduced or lost services provided by such resources..."

During the three and a half years since the settlement, the Trustee Council has taken actions to better understand the nature

of injuries resulting from the spill and, where possible, restore the injured resources and the services which depend on them.

1994 Trustee Council Accomplishments

Adoption of the Restoration Plan

On November 2, 1994, after an extensive public review and comment process which involved thousands of individuals, the Trustee Council adopted a final *Restoration Plan* to provide long-range guidance for the restoration program. The plan outlines a comprehensive, balanced approach with elements of habitat protection, research and monitoring, restoration activities and establishment of a reserve account to support long-term restoration work. The plan was subject to a complete Environmental Impact Statement, which was also finalized by the Trustees in November 1994.

Habitat Acquisition and Protection

Habitat protection has been identified as one of the key tools for restoration. Over the last three years, the Trustee Council has worked with willing private landowners in the spill area to evaluate their lands with the goal of protecting habitat important to the recovery of injured resources and services. Protection of these lands through purchase agreements or conservation easements is designed to prevent additional injury to resources and services while recovery is taking place and into the future.

The Trustee Council took action soon after its inception to protect three large parcels of land imminently threatened by

timber harvest. In 1993, the Trustees contributed \$7.5 million to the purchase of 23,800 acres of private inholdings within Kachemak Bay State Park on the Kenai Peninsula. This acquisition includes a highly productive estuary, several miles of anadromous fish streams, and intertidal shoreline and upland habitat supporting such species as bald eagles, marbled murrelets, river otters, and harlequin ducks.

The Trustees also purchased 41,549 acres on northern Afognak Island (17,166 acres on Seal Bay and 24,383 acres on Tonki Cape), which were dedicated in 1994 as the Afognak Island State Park. This mature spruce forest habitat is adjacent to

highly productive marine waters, includes anadromous fish streams, and provides excellent habitat for bald eagle and marbled murrelet nesting.

In early 1995, the Trustee Council purchased timber rights on lands in the Orca Narrows section of Prince William Sound to protect important habitat in the vicinity of Cordova. The parcel contains anadromous fish streams, active bald eagle nests and favorable habitat for marbled murrelet nesting.

In November and December 1994, the Trustee Council authorized funding for the protection of additional habitat identified as important to the resources and services

injured by the spill. Prospective purchases and conservation easement protection packages currently under negotiation include approximately 265,000 acres on Kodiak Island within the Kodiak National Wildlife Refuge, 74,000 acres on Afognak and Shuyak Islands, and approximately 160,000 acres in Prince William Sound.

Discussions with landowners on the Kenai Peninsula concerning the purchase of inholdings in Kenai Fjords National Park will also continue in 1995. In addition, the Trustee Council will consider protection of several smaller tracts of habitat (under 1,000 acres each) through the Small Parcel Protection Program, which has been of high interest to the public.

Noteworthy Scientific Achievements

In 1994 the Trustee Council funded 74 projects as part of the annual work plan. Project teams monitored recovery of individual species injured by the spill, conducted ecological research to determine the reasons resources are not recovering or are recovering slowly, and in some cases directly manipulated the environment to aid recovery. The results of several of these projects are particularly noteworthy.

WILD PINK SALMON STOCKS PROTECTED THROUGH USE OF CODED WIRE TAGS AND OTOLITH MARKING

The Trustee Council has supported a coded wire tag program for several years as part of its efforts to restore pink salmon. Use of information obtained in 1994 from coded wire tags helped ensure that wild pink salmon streams in the spill-affected areas of Prince William Sound met their spawning escapement goals (the



View from a ridge overlooking Pillar Lake and Seal Bay in Afognak Island State Park. The Trustee Council purchased lands on Afognak Island in 1993 to protect habitat important to resources injured by the spill. Governor Hickel dedicated the area as Afognak Island State Park in May 1994.

Photo by Glenn Holstad, ADNR

number of salmon needed to "escape" harvest and spawn) while allowing a healthy harvest for fishermen in the sound.

Coded wire tags are small pieces of wire encoded with information about the fish's origin which are inserted in a certain percentage of hatchery-raised juvenile salmon. When the tagged hatchery fish — along with wild stocks — return as adults, fishery managers can use data from recovered tags to determine what proportions of the harvest are composed of wild and hatchery fish. This information allows managers to open and close the fishery to protect wild salmon stocks from overharvest.

While successful in protecting wild stocks, the coded wire tag project has been labor intensive and expensive. For this reason, the Trustee Council authorized 1995 funding for equipment in four Prince William Sound hatcheries to make it possible for hatchery operators to more efficiently mark all of the fish reared at the hatchery by selectively increasing water temperatures during fry rearing. Controlled temperature manipulation leaves a detectable band or growth ring on a small bone (the otolith) in the salmon which can be examined in the same way as coded wire tags when the fish are recovered. When fully developed, the otolith marking program will allow for in-season harvest management to protect wild stocks. It will also help address long-standing questions about the "mixing" of hatchery fish into wild stock streams.

□ GENETIC IMPAIRMENT OF PINK SALMON EXPOSED TO OIL

Long-term investigations of injury to pink salmon indicate that pink salmon eggs may be experiencing higher mortality

as a result of genetic damage caused by exposure to oil. Researchers have conducted experiments over the past several years to examine survival of eggs produced by salmon from oiled and unoiled streams. Results indicate significantly higher egg mortality among salmon from oiled streams even after other possible factors have been eliminated through laboratory testing.

Results to date appear to support the hypothesis that salmon exposed to oil may not only experience direct toxic effects but also long-term genetic damage that can be passed from one generation of salmon to the next. The latest research indicates that increased egg mortality appears to have diminished below statistically significant levels in even-year pink stocks. Odd-year returns of pink salmon, however, still have not recovered. These trends will need continued monitoring in future years.

□ ADULT WALLEYE POLLOCK IDENTIFIED AS IMPORTANT JUVENILE SALMON PREDATORS

Researchers found in 1994 that walleye pollock in Prince William Sound may switch between feeding on immature fish and copepods (a type of zooplankton) depending on the numbers of copepods available. This finding sheds light on a possible contributor to the failure of the pink salmon run in the sound in 1993. Those fish were juveniles in 1992, when the population of copepods was low. Thus, the run failure may have been caused in part by walleye pollock feeding on juvenile salmon. Research is continuing on the source of fluctuations in the copepod population bloom and techniques to ensure good survival of juvenile salmon.

□ GENETIC STOCK IDENTIFICATION AS A MANAGEMENT TOOL FOR SOCKEYE SALMON IN LOWER COOK INLET

A database of genetic information from approximately 30 sub-populations of sockeye salmon among the Kenai/Skilak, western Cook Inlet, Kasilof, and Susitna systems was completed by Trustee Council researchers in 1994. Genetic stock identification techniques have been under development since 1992 as a means of tracking sockeye salmon from the Kenai River system through the mixed stock fisheries of Cook Inlet.

Using tissue samples from the commercial catch, stock composition estimates can now be provided within 48 hours to enable fishery managers to allocate harvest quotas. By controlling the number of spawning sockeye, and hence fry production, managers will be better able to help restore and manage productivity of the rearing lakes in the Kenai River system.

□ PRISTANE ABUNDANCE: A POSSIBLE NEW RESEARCH TOOL

Trustee Council scientists discovered that tracking the presence of pristane, a naturally occurring hydrocarbon molecule produced by copepods, a small marine zooplankton, may provide a cost-effective means of evaluating the productivity of

marine ecosystems. This research tool may be useful not only for restoration studies, but eventually to scientists working on many other types of marine studies.

Zooplankton are tiny, shrimp-like animals eaten by fish, which assimilate some of the pristane and release some back into the environment in their feces. These fish are, in turn, eaten by other fish, birds, and mammals which also assimilate some of the pristane and release some back into the environment.

Pristane from the feces is then assimilated by mussels and other filter feeders.

By collecting and measuring pristane in mussels each year, scientists may be able to obtain a simple indicator of marine productivity.



An Alaska Department of Fish and Game field biologist prepares tissue from a Russian River sockeye salmon for genetic tests. Samples of muscle, liver, heart and eye tissues were prepared and stored in liquid nitrogen, then transported to the laboratory for analysis as part of a genetic stock identification project to aid in managing sockeye in lower Cook Inlet fisheries.

Photo by Dr. David Koenig

Alaska SeaLife Center

In November 1994, the Trustee Council conditionally authorized funding of up to \$24.9 million to support construction of a marine research facility in Seward. This amount was in addition to the \$12.5 million already allocated to the project from the state's Exxon Valdez oil spill criminal funds. Affiliated with the University of Alaska School of Fisheries and Ocean Sciences, the new facility will provide presently unavailable laboratory capabilities for research and monitoring of marine mammals — primarily harbor seals and sea otters, and marine birds. Wet and dry labs will also be available for salmon and herring genetics research, and for studies of bioenergetics, disease, reproduction, and neurobiology associated

with fish and invertebrates in the spill area. Subject to a number of final approvals, initial construction on the project is anticipated to start in the summer of 1995, with an expected completion date in 1997.

The Restoration Reserve: 2002 and Beyond

In 1994, the Trustee Council established the Restoration Reserve, a savings account to fund needed restoration activities after Exxon payments end in 2001. The Council has thus far set aside \$24 million for the Reserve. While additional allocations will be made only after reviewing each year's restoration needs, the Trustees anticipate that approximately \$12 million will be added to the Reserve for each of the remaining years of Exxon payments. These deposits would build the Reserve to a balance of \$108 million, plus accrued interest, by the year 2001. The Trustee Council will decide in future years how best to use the Restoration Reserve.

1995 Work Plan

The Trustee Council's restoration efforts in 1995 will continue to emphasize restoration of pink salmon, sockeye salmon, herring, harbor seals, birds, and the commercial fishery and subsistence services which depend on the health and abundance of these and other injured resources. In 1995, the Prince William Sound System Investigation entered its second year. This large-scale, multi-year ecosystem research program concentrates on natural and spill-related factors which may be constraining recovery of pink salmon and herring in Prince William Sound. This project also provides information useful to other restoration activities, particularly those addressing marine mammals and seabirds.

The conclusion of ongoing habitat protection negotiations will also be a major emphasis in 1995.

Long-Range Planning

Development of the 1996 work plan is already underway. The 1996 work plan will attempt to anticipate and plan for the work that needs to be done over the next several years in order to restore the natural resources and services injured by the oil spill. Longer-term planning will provide more efficient management of the restoration program.

Coordination With Criminal Settlement Funds

As part of the criminal plea agreement, Exxon paid \$50 million each to the State of Alaska and to the United States to be used for restoration projects relating to the oil spill. The state and federal governments separately manage these payments; the funds are not under the authority of the Trustee Council. However, in order to maximize opportunities for restoration, the Council will continue to coordinate with programs funded through the criminal settlement.

The federal criminal funds allocated to date have been designated primarily to complement the Trustee Council's habitat acquisition efforts. The state funds have been appropriated by the Alaska Legislature for a variety of purposes.

Of particular interest:

- **SUBSISTENCE.** *Five million dollars was appropriated to the Alaska Department of Community and Regional Affairs for grants to unincorporated communities to restore subsistence resources. Grants were awarded in late 1994 for several projects, which included mariculture*

Presidents of Kodiak Island villages met in September 1994 with staff from ADF&G's Subsistence Division and the Alaska Department of Community and Regional Affairs to discuss potential projects for restoration of subsistence resources.

Photo by Sandra Schneider



development, construction of a fish and game processing facility and a project to produce sockeye smolt as a replacement resource. Another project is establishing a spirit camp where young people from Native communities in the spill area will be taught to harvest subsistence resources in ways to minimize impacts on injured resources. Additional subsistence grants will be awarded in 1995.

- **KENAI RIVER** Three million dollars was appropriated to the Alaska Department of Fish and Game for habitat restoration and enhancement projects within the Kenai River watershed. Funds thus far have been spent or earmarked for development of technical advice, preparation of public information materials, and stream bank restoration demonstration projects. A large portion of the remaining funds are slated for use in acquisition of parcels in the Kenai River watershed in order to protect salmon habitat.

- **RECREATION** The Alaska Department of Natural Resources received \$10.85 million for restoring recreational services. Restoration proposals were solicited in late 1994 with eligible projects evaluated and ranked by committees of private citizens in each region of the spill area. Projects include construction of trails, interpretive displays, camp sites, cabins, mooring buoys, boat launches, and boardwalks throughout the spill area. In addition, some funding will be set aside for recreational amenities on lands acquired under the Trustee Council habitat protection program.

- **OIL SPILL PREVENTION** The Alaska Department of Environmental Conservation received an appropriation of \$3.25 million for research on prevention and cleanup of future oil spills. Research proposals were solicited in early 1995 and are currently undergoing peer review by the state's Spill Technology Review Council prior to final awarding of funds.

UPDATE ON THE RECOVERY OF INJURED RESOURCES AND SERVICES

Six years after the *Exxon Valdez* oil spill, recovery is occurring at different rates for different resources.

Some resources, such as bald eagles, seem to have fully recovered or are well on the way. Others, such as Pacific herring in Prince William Sound, were affected by the spill and are in significant decline. Several injured resources may be in a transitional state, such as common murre, which now appear to be following normal reproduction patterns, but have not regained pre-spill population numbers. In a number of cases, the recovery process is complicated by factors not related to the spill.



Working in an oiled mussel bed on Squaw Island, Chenequa residents Donald Kumpkoff, Jr. (right) and Pete Selanoff, Jr. place mussels in buckets for temporary transfer to a clean area on the beach. Oiled sediments were then removed, exchanged with clean sand and gravel, and the mussels were replaced on the clean sediments. Chenequa residents worked with Alaska Department of Environmental Conservation and National Marine Fisheries Service staff to clean up twelve mussel beds in 1994.

Photo by L. J. Allen

The Trustee Council has supported a comprehensive, balanced restoration program, with elements of research, monitoring and direct restoration, as well as protecting habitat important to the recovery of injured resources. Restoration activities have resulted in acceleration of recovery for some resources; for other resources the best that can be done is to monitor the progress of recovery. In a few cases, research to determine the source of continuing problems has resulted in scientific breakthroughs which will benefit resource management far beyond the bounds of the spill-affected area.

Oil Remaining in the environment

Residual subsurface oil lingers in patches on beaches within the spill region. At some locations the oil continues to cause contamination problems, especially in mussel beds. In 1994, assessment teams focused on oiled mussel beds in Prince William Sound and on the outer Kenai Peninsula.

With the assistance of Chenequa residents, thirty-eight tons of oiled sediment was removed from beneath twelve oiled mussel beds in Prince William Sound during the summer of 1994. The team members replaced the oiled gravel with clean sediment, resulting in a 95 percent reduction of oil at those sites. These sites will be monitored in future years to determine the effectiveness of this cleanup technique.

Chenequa residents also helped clean up beaches identified as especially important for subsistence use.

Almost 2,000 square meters of asphalt deposits were broken up on beaches close to Chenega by staff working on this project. A project in 1995 will assess shoreline oiling of concern to residents of Kodiak Island communities ■

Harbor Seals

Harbor seals, already in serious decline throughout Prince William Sound and the Gulf of Alaska prior to 1989, showed no sign of recovery in 1994 from either spill-related effects or the ongoing decline.

Pilot studies conducted in 1994 using two new techniques, however, provided surprising information which may help biologists understand the lack of recovery. Chemical tests conducted on whiskers and blubber samples from harbor seals in Prince William Sound showed that the seals ate different prey during different times of the year, that they were consuming different foods in various parts of the sound, and that adults and juveniles were eating different things.

Data collected during 1992 - 1994 from harbor seals tagged with satellite-linked transmitters indicated that seals usually do not move far from their haulout sites. In fact, they are remarkably faithful to the same one or two haulout locations for many months. The haulout information, coupled with the new findings on feeding habits, suggests that the prey preferred by seals, such as pollock, herring or other small fish, are not all available at all sites or are available in varying amounts. This data may provide an

important clue in understanding whether food availability is in some way preventing harbor seals from recovering.

Biologists also conducted surveys during spring pupping and fall molting periods in 1994 to monitor the population trends of harbor seals in Prince William Sound. The number of seals found at oiled sites was unchanged from counts conducted soon after the spill and the total observed remained over 40 percent lower than the number documented by a 1988, pre-spill survey. At unoled sites the declines which began before the spill continued. From these results, it is clear that determining the recovery of this species is complicated by factors existing before the spill.

Trustee Council-funded studies of the harbor seal decline are being conducted in parallel with similar Gulf of Alaska harbor seal research undertaken by the Alaska Department of Fish and Game and funded by the National Oceanic and Atmospheric Administration. Follow-up research on harbor seal diets is planned in 1995 to determine whether the continuing harbor seal decline may be related to food limitations or to predation by killer whales ■



Biologists Vladimir Buzarov, Lloyd Lowry and Rob DeLong (left to right) weigh a harbor seal in September 1994. The seal was released unharmed as soon as the team required it, took some tissue samples and attached a radio transmitter as part of a Trustee Council project. Buzarov was assisting as part of a cooperative exchange program on marine mammals between the Russian Academy of Sciences and the Alaska Department of Fish and Game.

Harlequin Ducks

Harlequin ducks still do not appear to be reproducing in significant numbers in the heavily oiled western half of Prince William Sound. Several years of studies have not yet led scientists to rule out oil exposure as an underlying cause of this decline, rather than some natural geographic difference between the western and eastern sides of the sound.

Researchers did, however, make several new discoveries regarding harlequin ducks in 1994. First, analysis of 1993 data showed that enzymes which increase in response to exposure to oil were present in greater amounts in ducks collected in western than in eastern Prince William Sound.

A second finding, key to the continued monitoring of this species, was the discovery of a subtle distinction in plumage between male harlequin ducks of different ages. In future surveys it will now be possible to determine the proportions of adult to young males, bringing researchers closer to knowing whether harlequin ducks are reproducing in the oil spill area ■

Marbled murrelets

The spill region is home to a large proportion of the entire North American population of marbled murrelets. As much as 50 percent of the population in Prince William Sound and 6 percent throughout the spill region may have been killed immediately following the spill.

The Trustee Council has funded a number of scientific studies in past years which have contributed to understanding the growth and reproduction patterns of marbled murrelets in the spill region — including identification of old-growth



This juvenile marbled murrelet, almost ready to fly, was weighed, measured and banded before biologists returned it to its nest. A 1.5 gram radio transmitter glued to its back fell off prematurely during the bird's autumn molt. Biologists with tracking equipment followed the fledgling bird for over two weeks as it foraged and dove for fish in the Port Neke, Juan area. This project provided information scientists need to aid recovery of marbled murrelets in the spill region.

Photo by David Mertz, USFWS.

forests as the areas that murrelets prefer for their nests. The Council's actions to protect habitat in the last several years have been influenced by concern for the preservation of marbled murrelet nesting areas.

In 1993 and 1994 Trustee Council biologists studied the food collecting or foraging habits of these diminutive seabirds. Researchers found that fifty-six marbled murrelets fitted with small radio transmitters foraged for food an average of 21 kilometers from their nests, primarily in shallow water or other sites where water rises to the surface, bringing small fish and other nutrients with it. Work was also undertaken in 1994 to develop an index of reproductive success based on the abundance of marbled murrelet chicks observed at sea in late summer ■

Common Murres

Trustee Council research on common murres has focused on the Barren Islands, a heavily-oiled Gulf of Alaska site

with sizable murre populations prior to 1989. Earlier surveys found that because of the spill, reproductive patterns were disrupted, breeding was later than normal, and the number of chicks produced was low. Although the reproductive timing and success of murres are now within normal bounds, survey data suggest that populations have not recovered to pre-spill numbers. Scientists are planning work in 1995 intended to provide a better understanding of the relationships between available food resources and the ability of murres to reproduce ■

Pigeon Guillemots

By comparing 1994 data on pigeon guillemot feeding habits with observations made in 1979-1981, scientists have noted changes in the available food sources over the last 15 years.

In the earlier studies, sandlance were documented as the single most important forage fish in the diet of guillemot chicks. In 1994, sandlance accounted for only about 8 percent of the items brought back to the nest for chicks. This decrease in sandlance was balanced by a corresponding increase in cod and pollock, which went from less than 7 percent of the diet in 1979-1981 to about 30 percent in 1994.

These results suggest a change in the composition of schooling fish since 1980 in northwestern Prince William Sound. Understanding the causes of such changes may lead to a better understanding of



Biologists estimate that common murres have been nesting at this site on East Annette Island in the Barren Islands for hundreds, possibly thousands, of years. Murres live to be more than 20 years old and typically lay only one egg each year. Trustee Council research funded in 1994 revealed that murre reproduction patterns disrupted following the spill appear to have returned to normal, but the number of birds is still significantly lower than pre-spill counts.

Photo by Art Swartz, USFWS

long-term trends in important fish, birds and marine mammals in the Kodiak and Gulf of Alaska regions, as well as in Prince William Sound ■

Forage Fish

Because of the importance of forage fish in the diets of many injured resources, the

Trustee Council initiated a study in 1994 to assess their abundance, distribution and composition. Sandlance, pollock, herring, smelt and capelin serve as very important food sources for marine mammals, seabirds and larger fish. Their availability affects the reproduction and survival of young for a number of recovering species.

The primary objectives of the forage fish project in 1994 were to test techniques and collect data in Prince William Sound to aid in designing sampling methods for subsequent years. Researchers conducted seabird surveys simultaneously with hydroacoustic surveys to provide information on the presence of fish in the water. Groups of seabirds were found to be strongly associated with dense schools of forage fish near the

water's surface. The distribution of forage fish was found to be influenced by ocean currents, underwater geographical features, and the proximity of predators.

In 1995 Trustee Council scientists plan to expand the forage fish project to include related monitoring and research on birds which prey on these small fish. This integrated forage fish/seabird project will focus initially on Prince William Sound, but may later test models explaining fish and seabird interactions by gathering data in the Gulf of Alaska ■

Pink Salmon & Herring



Biologist Bob Thomas takes tissue samples from a Pacific herring caught in Prince William Sound and exposed to oil in the lab. The tissues were analyzed for the presence of an enzyme as part of a reproduction impairment study conducted at the National Marine Fisheries Service laboratory in Auke Bay.

Photo by Mark Clark, NMFS

pink salmon fisheries. The program's goal is to better understand the ecological factors responsible for year-to-year differences in the success of herring and pink salmon in Prince William Sound.

In 1994 vessels were deployed to identify and gauge ocean currents, map underwater geographical features, collect samples and measure abundance of plankton and other nutrients. Year-to-year and seasonal

variations in nutrients, temperature and currents in the water appear to control the abundance, movement and timing of the plankton population. Plankton are a key food resource in the life cycles of pink salmon and herring.

During the 1994 field season, researchers observed a general counter-clockwise circulation in the upper 150 meters of the water circulation system through Prince William Sound. Below that depth a weaker clockwise gyre was observed. Water conditions in the spring set the stage for the annual production cycle influencing pink salmon and Pacific herring survival. SEA scientists will be investigating further who eats whom in the surface waters of the sound, and how the survival of larval pink salmon and herring is affected by different physical and biological conditions.

In addition to this major ecosystem research effort, the Trustee Council also funded a number of other pink salmon projects in 1994. These included development of an otolith mass marking program to replace the current coded wire tag program, as well as continued laboratory and field studies on the genetic effects of oil exposure on pink salmon and possible impacts on pink salmon straying.

The 1994 return of hatchery and wild pink salmon to Prince William Sound resulted

Dr. Ted Cooney (lower right) removes plankton samples collected in a net held by Jim Murphy while crew member Harry Altman operates the crane. Studies of plankton and other nutrients important to pink salmon and Pacific herring are part of the Prince William Sound System Investigation.

Photo by Peter Giles



in the second highest harvest on record. In spite of this record catch, however, counts of wild sock returns were below average. Scientists point out that it will take several more years of study before a final determination of pink salmon recovery can be made.

The Pacific

herring run in Prince William Sound unexpectedly collapsed in the spring of 1994.

The total geographic area where herring spawn and the estimated tons of herring returning to spawn were the lowest

observed since surveys began in the early 1970s. The Finance Council responded at

once by expanding its research to investigate all possible causes for the collapse. One possibility immediately pursued was the presence of a virus first detected in 1993 and again in 1994. Its role in the population decline is still not clear. In addition, the fungus *Ichthyophonus* was detected in 30 percent of the 1994 samples, compared to 5 percent of the fish sampled in previous years.

This pathogen has a well-documented history of causing major population crashes in Atlantic herring and its effects appear to be stress-related. It is possible both the virus and fungus effects were exacerbated by the additional stress placed upon herring by the oil spill. Herring studies planned for 1995 include collecting information on bird predation on herring eggs and spawn as well as studies of other factors which influence herring survival. ■

A researcher views a few of the top of a herring area about 300' long and 100' deep one week after Genhoses at the Alaska Marine Fisheries Service equipped the newly deep-sea gear to collect fish from herring trawl systems from which samples to be analyzed for demographic data.

near to the coast, USA



Sockeye Salmon

A dual sockeye salmon returns to the Kona River system in 1994 were three times that forecast by biologists.

Fishing closures in 1989 because of the oil spill appeared to have led to overpopulation in the sockeye rearing lakes, resulting in too many salmon fry to be supported by the available food. This had led fishery managers to predict significant declines in sockeye returns. The 1994 returns suggest that the major decrease in returning adults forecast for 1995 and 1996 may not be as great as initially feared. Those returns will be closely monitored and factored into decisions on future sockeye restoration activities.

On Kodiak Island, surveys of the Red Lake sockeye run conducted in 1994 showed an increase in fry abundance which may be an indicator that this system is moving towards recovery. However, smolt popu-

lation estimates derived in 1994 suggest that future adult returns will be poor and may require highly conservative management measures to ensure meeting even minimum escapement goals. On the south end of Kodiak Island, Akaluta Lake experienced a very weak adult sockeye return in 1994, with less than half of the escapement goal achieved. The long term recovery strategy for Akaluta is to manage the fishery to make sure sufficient adults return to spawn in order to increase the overall population.

The 1994 season was the third of a five-year program to fertilize Coghill Lake in Prince William Sound to stimulate sockeye repopulation as a replacement fishery for commercial and sport fishing opportunities lost as a result of the spill. The Alaska Board of Fisheries also established a no-fishing corridor near Esther Island to minimize Coghill Lake sockeye interception. Monitoring results in 1994 indicated improved survival of sockeye eggs and smolt ■

Intertidal Communities

The key to recovery in the intertidal zone appears to be re-establishment of the brown seaweed *Fucus*. In the lower and middle intertidal zones *Fucus* appears to have recovered, but it has been much slower to recover in the upper intertidal zone.

The slowness of recovery in the upper intertidal zone seems to be related to lack of development of a *Fucus* canopy — the thick, protective layer of large, gelatinous leaves of adult plants. The presence of this canopy on normal shorelines prevents young plants from drying out, provides habitat for invertebrates such as limpets and snails, and protects invertebrates from predation. The *Fucus* canopy thus becomes host to a varied and abundant population of organisms

which in turn provide food for small mammals and shorebirds such as oystercatchers.

New *Fucus* plants spread outward from adult plants, regaining ground in cracks in the rocks and shoreline sediments which retain moisture. Once the *Fucus* canopy becomes re-established in an area, there will be enough protection from drying out during summer low tides to ensure survival of young plants, and the canopy will spread further. Studies to determine the best restoration strategy for these intertidal communities will continue in 1995 ■

Archaeological Resources

Archaeological monitoring in 1994 primarily focused on sites in the spill region injured by vandalism. Sites located on the outer Kenai Peninsula coast, Shuyak and Afognak Islands in the Kodiak area, the Katmai coast on the Alaska Peninsula, and in Prince William Sound were assessed for any effects from vandalism, erosion or other factors.

In some cases the sites appear to be unchanged, and restoration efforts such as re-filling holes left by artifact hunters seem to have been successful. At one site surveyed on the Kenai Peninsula, although no evidence of vandalism was found, house pits contained debris left by modern campers.

Intensive testing and evaluation of one 1800-year-old injured archaeological site on the Kenai coast revealed the presence of significant numbers of animal remains, which makes it particularly important for the study of early Alaskan subsistence practices. Another site in Prince William Sound provided information about structures constructed by early people. This kind of information is rarely recovered from sites in the sound. Archaeologists will continue analyzing their



findings and conduct some additional testing and site restoration work in 1995.

Funded by the Trustee Council in 1993, the Alutiq Archaeological Repository in Kodiak will open to the public in May 1995. The repository will provide safe, secure storage and access for the study of artifacts and other data recovered from cultural sites in the Kodiak region. The repository project was developed by the Kodiak Area Native Association in cooperation with the Natives of Kodiak, with start-up funding of \$1.5 million from the Trustee Council. Repository staff will also help preserve and teach the knowledge of traditional subsistence practices of the Native community and develop public education efforts to help reduce vandalism damage to archaeological sites and artifacts ■

Subsistence

Residents of some communities in the path of the oil spill are still concerned about possible oil contamination of traditional subsistence food resources. The 1994 program worked with community members to help restore confidence in their ability to determine the safety of subsistence foods by involving subsistence users in every phase of the project.

Samples of subsistence resources were collected by local residents from harvest areas used by communities in Prince William Sound, the Gulf of Alaska and Kodiak. Representatives of the village communities traveled to Seattle to meet with laboratory staff conducting hydrocarbon contamination tests on the samples, see the samples being analyzed, and exchange information with researchers. Test findings will be reported back to the communities. The Trustees plan to continue and expand the dialogue between subsistence users and sci-



Rick Kiechl displays a reproduction of an Alutiq mask while standing in the nearly completed Alutiq Archaeological Repository in Kodiak. The repository, partially funded by the Trustee Council, will open to the public in May 1995.

● Patricia Moran/Alutiq

entists working with the injured resources in 1995 and future years.

Another important element of subsistence restoration efforts in 1994 was a program to work cooperatively with subsistence marine mammal hunters in the spill area to compile information and produce a set of recommendations regarding harbor seal and sea otter harvest. The information will be used to guide subsistence users who want to voluntarily change their harvest practices to help these two species recover ■

Resources & Services Injured by the Spill

Biological resources in the table below experienced population-level or continuing sublethal injuries ■

INJURED RESOURCES		Other	LOST OR REDUCED SERVICES
Biological Resources			Other
Recovering	Not Recovering	Archaeological resources	Commercial fishing
Bald eagle	Common murre	Designated wilderness areas	Passive uses
Black oystercatcher	Harbor seal	Sediments	Recreation & Tourism (including sport fishing, sport hunting, and other recreation uses)
Intertidal organisms (some)	Harlequin duck		Subsistence
Killer whale	Intertidal organisms (some)		
Mussels	Marbled murrelet		
Sockeye salmon (Red Lake)	Pacific herring		
Subtidal organisms (some)	Pigeon guillemot		
Recovery Unknown	Pink salmon		
Clams	Sea otter		
Cutthroat trout	Sockeye salmon (Kenai & Akuluta systems)		
Dolly Varden	Subtidal organisms (some)		
River otter			
Rockfish			

Amending the List of Injured Resources & Services

The list of injured resources and services will be reviewed as new information is obtained. The Trustee Council received petitions in 1994 requesting review and addition of several species and subspecies, mostly marine birds. Information required to amend the list will be reviewed through the Trustee Council's scientific review process ■

PUBLIC PARTICIPATION

The Trustee Council continues to make a significant commitment to involve the public in planning and implementing restoration activities. Highlights of these efforts in 1994 include:

Public meetings — All Trustee Council meetings are open to the public and accessible to all the communities in the spill region via teleconference. Trustees or their representatives held public meetings during 1994 in Port Graham, Chenega Bay (via teleconference), Homer, Cordova, Kodiak, Valdez and Seward to exchange information and solicit public comment.

Another series of meetings was held to assist in developing restoration strategies for subsistence resources. These meetings took place in the communities of Chenega Bay, Tatitlek, Cordova, Valdez, Port Graham, Kodiak, Chignik Bay, Perryville, and included representatives from Chignik Lake and Ivanoff Bay. In addition, hearings on the Draft Environmental Impact Statement for the Restoration Plan were held in Anchorage, Cordova, Homer, Kodiak, Seward and Valdez.

On March 22, 1994, the Trustee Council sponsored a public forum, *Five Years Later: What have we learned?* Scientists made presentations on the status of injured resources and Trustee Council representatives discussed the restoration program with more than 200 members of the public, as part of activi-

ties commemorating the fifth anniversary of the March 24, 1989 oil spill.

Workshops — Representatives of the public and the Public Advisory Group participated in several Trustee Council-sponsored technical workshops and meetings this year. Members of the public enriched the process by sharing the perspectives of commercial fishermen, subsistence users and residents of the spill-affected communities. Workshop subjects covered in 1994 and early 1995 included a broad-based review of restoration science and planning, recovery strategies for herring, pink salmon, sockeye salmon, fish genetics, intertidal and subtidal organisms, wild salmon stock supplementation, and a review of the Cordova-based study of ecosystem factors affecting pink salmon and herring in Prince William Sound.



Kathy Frost (lower right) leads a discussion among a group of experts on marine mammals, representatives of the public and Trustee Council staff in April 1994. The Trustee Council sponsored several technical workshops to plan restoration activities in the last year which brought together specialists on resources injured by the spill.

Photo by L.J. Evans

Publications — This past year saw the inception of the *Restoration Update*, a newsletter that shares information with approximately 2,500 members of the public, mostly Alaskans living in the

spill area. The newsletter focuses primarily on Trustee Council activities as well as the results of projects Trustee Council researchers are conducting to aid recovery of injured resources and services.

As part of its public education efforts, the Trustee Council printed and distributed an educational poster about the Alaska marine ecosystems affected by the spill. The poster depicts species representative of the entire ecosystem, from zooplankton to killer whales. The poster text explains how the elements of a marine ecosystem work together, and how these elements were injured by the spill. The poster is being distributed through the Oil Spill Public Information Center, the Alaska Sea Grant College Program, and the Alaska Natural History Association.

March 1994 saw the first publication of the Annual Status Report. The Trustee Council has committed to producing a status report each year to report to the public on the recovery of injured resources and restoration activities underway.

Public Advisory Group — The Public Advisory Group completed its first two year term on October 15, 1994. The PAG consists of seventeen Alaskans, mostly from communities in the spill region, representing a variety of public



As one of a series of public meetings in April 1994 to update community members on the status of injuries from the oil spill, Molly McCammon and Joe Sullivan met with residents of Port Graham. Left to right, clockwise around the table are Joe Sullivan, Molly McCammon, Bob Harbison, Victor Carlucci, Genevieve Kwanikoff, Fran Norman, Philip Anashkin and Eleanor McMiller.

Photo by the author. AP/62

interests. During 1994 the PAG met four times, providing advice to the Trustees on a variety of subjects including the 1994 and 1995 work plans, habitat protection strategies and the Alaska SeaLife Center in Seward. A new two-year slate of PAG members will continue to provide advice to the Trustees.

Documents — With completion and distribution of the Restoration Plan, the Trustee Council concluded a public involvement process which extended over two years and incorporated verbal or written comments from more than 2,000 people. The Trustees also solicited public comment this year on the Draft 1995 Work Plan, and the Draft Environmental Impact Statements for the Restoration Plan and for the Infrastructure Improvements to the Seward Institute of Marine Science (Alaska SeaLife Center).

In the civil settlement, Exxon Corporation agreed to pay the United States and the State of Alaska \$900 million over ten years to restore resources injured and services reduced or lost as a result of the *Exxon Valdez* oil spill. From these payments, \$337 million has been authorized for research, monitoring, general restoration, habitat protection, reimbursements, and deductions. The Trustee Council has also allocated \$24 million to the Restoration Reserve.

Past and estimated future uses of the civil settlement fund as of March 1995 are outlined here. This table shows past deductions and expenditures as well as estimates of future expenditures for planning purposes. Estimated uses are just that. The Trustee Council has the authority and flexibility to make annual funding decisions based on annual restoration needs.

PAST AND ESTIMATED FUTURE USES OF CIVIL SETTLEMENT FUNDS *as of March 1995*

Research, Monitoring & General Restoration	\$217 – \$247 million (estimate)
Past Authorizations:	\$110.5 million
\$19.2 million—1992 Work Plan	
\$15.5 million—1993 Work Plan	
\$27.8 million—1994 Work Plan	
\$23.0 million—1995 Work Plan	
\$25.0 million—Research Infrastructure Improvements (Alaska Sealife Center)	
Estimated Future Authorizations:	\$107 – \$137 million
Calculated as the residual of \$900 million less past and estimated future authorizations for other restoration purposes.	
Restoration Reserve	\$108 million plus interest (estimate)
Past Authorizations:	\$24.0 million
Estimated Future Authorizations:	\$84 million (\$12 million per year through fiscal year 2002)

Habitat Protection	\$342 – \$372 million (estimate)
Past Actions:	\$50.2 million
\$7.5 million— <i>resholdings in Kachemak Bay State Park</i>	
\$38.6 million— <i>Seal Bay on Adognak Island (\$38.7 for purchase and \$0.9 in estimated interest)</i>	
\$3.1 million— <i>timber rights at Orca Narrows</i>	
Estimated Future Actions:	\$292 – \$322 million
Reimbursements	\$177 million (estimate)
Past Reimbursements:	\$150.4 million
<i>To the federal and state governments for past damage assessment, cleanup, response, restoration, and litigation expenses.</i>	
Estimated Future Reimbursements:	\$26.3 million
Adjustments	\$26 million
<i>Includes \$39.9 million deducted by Exxon from the 1992 payment for cleanup costs after January 1, 1991; plus \$0.6 million in court fees; minus a credit of \$8.1 million for interest earned; and minus a credit of \$6.7 million not expended by agencies.</i>	
TOTAL EXPENDITURE	\$900 million plus interest

This report is intended to be a summary only. More detailed financial information is available by contacting the Oil Spill Public Information Center at 645 G Street, Anchorage, Alaska 99501 or call 907/278-8008, toll free within Alaska or 800/478-7745, toll free outside Alaska or 800/283-7745.



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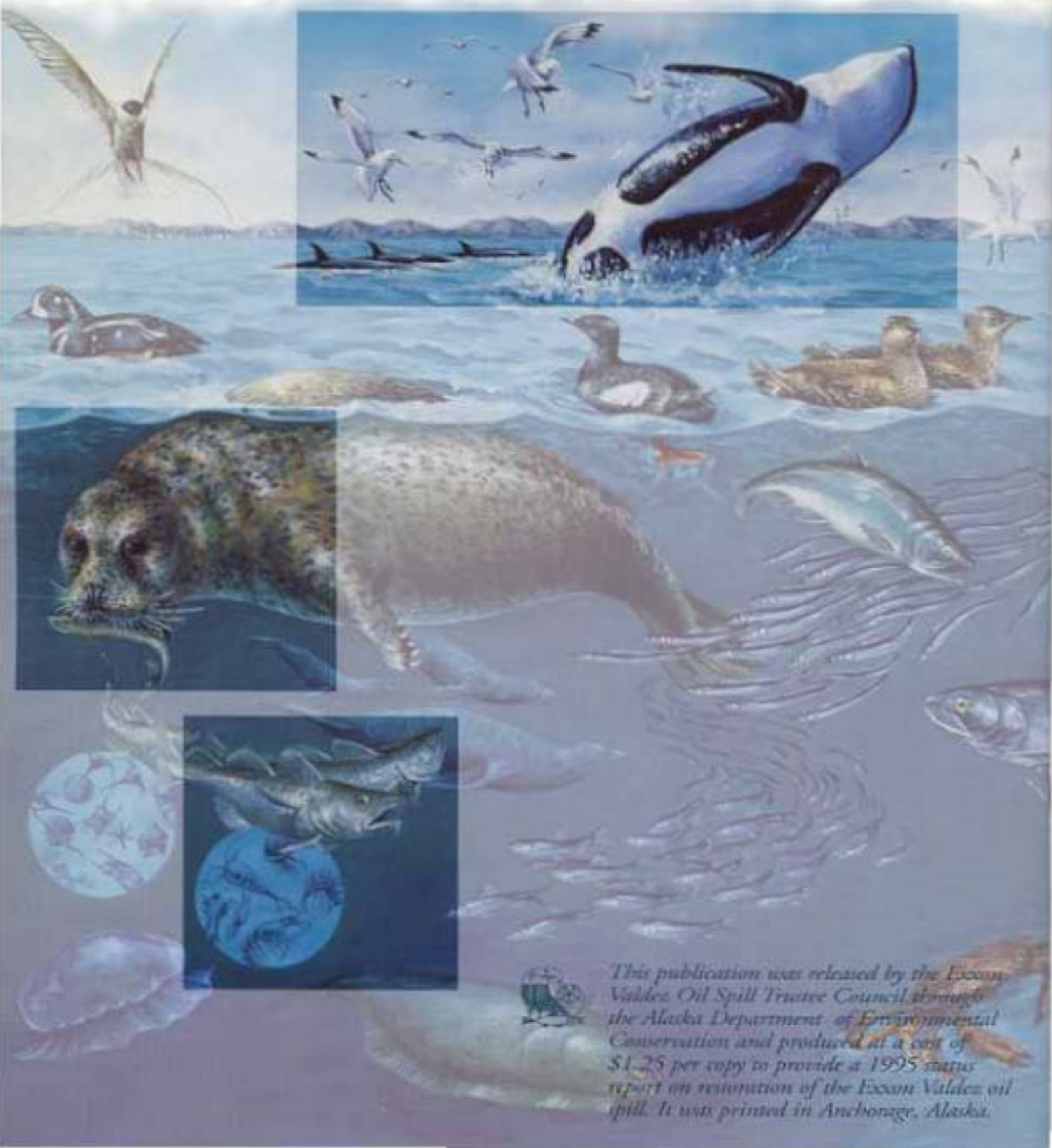
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1995 Status Report



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