WORK PLAN: DETECTION PROBABILITY (SEARCHER EFFICIENCY)(STUDY 1B)

October 12, 2010

1.0 INTRODUCTION

The Deepwater Horizon (MSC 252) oil spill began April 22, 2010 in the Gulf of Mexico. The entities responsible for the management and protection of avian resources (the US Fish and Wildlife Service (FWS), the National Park Service, and the States of Florida, Alabama, Mississippi, Louisiana, and Texas, collectively the Trustees) are developing and implementing study plans to concurrently evaluate oil spill-related injuries to avian receptors, including but not necessarily limited to seabirds, colonial waterbirds, coastal marsh birds, and shorebirds.

The Beached Bird Study (Study 1) is designed to estimate the rate of spill-related carcass deposition throughout the spill area (currently defined as coastal shoreline from Texas east to the Florida panhandle). By documenting and collecting bird carcasses of all species from beaches within the study area, including coastal mainland and barrier island beaches, the study will provide a direct measure of background and oil spill-related avian mortality. One of the major factors impacting the number of carcasses recovered in the study area on a given search is carcass-detection rate (also referred to as searcher efficiency), which is defined as the probability that a searcher will detect a carcass known to be on a beach during a standardized search 'event' (Byrd and Reynolds 2006a, Byrd et al. 2009). Because carcass-detection rates are variable, dependent upon a range of local factors, the Trustees believe it is important to document detection rates on a site-specific basis (Van Pelt and Piatt 1995, Fowler and Flint 1997, Ford 2006, Bryd et al. 2009).

The purpose of this study (Study 1A) is to collect data on carcass detection rates in areas that have been systematically and repeatedly searched as part of the Beached Bird Study. Results from this study will complement data collected during the Beached Bird Study and the Carcass Persistence Study (in preparation) by documenting search team carcass-detection rates, which in turn can be used to facilitate development of estimates of total avian mortality. The study also may provide information on potential relationships between carcass detection and the site-specific factors that may influence it.

2.0 SEARCHER EFFICIENCY STUDIES - GENERAL BACKGROUND

Searcher efficiency studies have been undertaken as part of assessment efforts for several oil spills in the U.S., including the *Selendang Ayu, Citrus, Cosco Busan, Luckenbach, Kure*, and *New Carissa*. Methodologies and results from these efforts have been considered and incorporated into this workplan, as appropriate. To provide context for the protocols proposed as part of Deepwater Horizon (MSC 252) natural resource damage assessment efforts, below we summarize some of the findings and issues identified in previous studies.

2.1 VARIABILITY IN CARCASS DETECTION RATES

Several studies have documented that searchers miss some proportion of dead birds on beaches and that the probability that a searcher will detect a carcass varies based on a range of site-specific and temporal factors (for examples, see Ford 2006). Carcass-detection rates reported from previous studies during oil spill response include a range of values: 3 to 55% (*Kure*, Ford 2006), 68% (*Cosco Busan*, Ford et al.

2009), and 44 to 94% (*Citrus*, Fowler and Flint 1997), to cite a few. As evident from these studies, detection rates vary widely by species and are heavily influenced by local environmental characteristics at the time of the spill. For example, Wiese and Robertson (2003) reported a 9% increase in carcass detection on boulder substrate compared to sandy substrate for the same species. Conversely, Fowler and Flint (1997) reported lower and more variable detection probabilities on rock beaches than sand beaches. Commonly cited factors impacting carcass-detection rates include carcass size and plumage characteristics, degree of scavenging on carcass (whole carcass versus fragments), beach substrate, quantity and type of debris in the search area, weather patterns, the density and pattern of carcass deposition, and search team methodology and effort (Fowler and Flint 1997, Flint et al. 1999, Hampton and Zafonte 2005, Ford 2006, Byrd et al. 2009).

Given this documented variability in carcass detection rates, differences in geographic location of studies available in the technical literature, and the potential magnitude of impacts to birds, the Trustees believe it is essential to design and implement a site-specific study on carcass detection for the Deepwater Horizon assessment.

2.2 METHODS

Researchers generally have applied one of two methods for estimating carcass-detection rates of search teams: 1) experimentally placing marked carcasses on transects, which are then searched using "standard" methods and effort applied for that spill (e.g., Ford and Ward 2000); or 2) applying standard and additional search efforts to selected transects with "naturally occurring" carcasses and then measuring any differences in carcass detection between searches conducted with different levels of effort (e.g., see Byrd et al. 2009).

This study will apply the former method (i.e., "carcass seeding"). Unoiled carcasses obtained from government agencies, research organizations, and/or other sources will be subtly marked and placed in transects to be searched by survey teams without their knowledge. Carcass species, size, condition, density, and pattern of placement generally will mimic conditions observed by spill survey teams.[1] This method has the advantage of establishing a known number of carcasses to be found by survey teams. Initial Trustee evaluations of carcass availability suggest that sufficient numbers of appropriate carcasses can be made available for this study.

This study will be implemented while beached bird surveys are ongoing, for at least two reasons: 1) assessing search efficiency with the actual teams conducting beached bird surveys, while they are conducting spill-related surveys, maximizes the utility of study results; and 2) this approach also provides substantial cost savings – the search teams are already searching, so the only incremental costs are those associated with placement and retrieval of carcasses and related reporting.

Appendix A to this workplan includes four SOPs providing detailed information on study methods, including: 1) bird preparation; 2) carcass distributions on transects; 3) deployment and retrieval of carcasses; and 4) data recording and chain of custody. These SOPs were developed in collaboration with representatives from BP and its consultant ENTRIX.

As noted in the SOPs, communication with beached bird survey teams and other response personnel will be important to ensure that carcasses placed for this study are not inadvertently logged as evidence and

[1] Because Beached Bird Survey results only reflect bird carcasses found by search teams, as described in this workplan and associated SOPs, for Searcher Efficiency purposes carcass species, size, condition and/or density were adjusted in some cases to reflect the potential for differences in search efficiency (e.g., finding birds in the wrack vs. other portions of the beach, small birds vs. large birds, etc.).

mistaken for "naturally occurring" carcasses. Carcasses used for the study will be tagged. Beached bird survey teams will be informed that a tagged carcass study is underway, and instructed on how to determine if carcasses found are associated with the study. To minimize the potential for search teams to knowingly or unknowingly modify their "standard" search effort/approach, to the extent feasible given study logistics, they will not be told which transects will be included in the search efficiency study, or on what day carcasses will be placed.

3.0 SAMPLING DESIGN

This version of the workplan contemplates study implementation during the last two weeks of September 2010, given our understanding that the remaining Beached Bird Survey teams will stand down at the end of September.

Exhibit 1 identifies Beached Bird Survey transects undergoing active searches during the last two weeks of September 2010. Exhibit 2 identifies the number of bird carcasses found (if any) at these transects (as of the week of 23 August 2010, the most recent data available to us).

For planning purposes we expect to be able to include approximately 30-40 transects in the Searcher Efficiency study effort. Logistics will largely determine which of the active transects can be included in the study. For example, some transects can only be accessed by boat or all-terrain vehicle. Distances between transects need to be manageable. Carcasses available for use in this study are all stored in Daphne, AL. Coordination with BBS teams will be critical, as they survey transects every three days, on average (but weather and other factors can change survey schedules). We intend to include some transects in all four states (FL, MS, AL, and LA). The final list of transects included in the Searcher Efficiency study will be provided in the field and data report generated after study completion.

The size, density, scavenging state and position of birds relative to the surf will be informed by Beached Bird Study data available to us, summarized below:

- Size (see Exhibit 3) – Data as of the week of 23 August indicate that 13.8% of carcasses found were 'small' (<0.2 kg), 59% were 'medium' (0.2 kg – 0.5 kg), 2.2% were 'large' (0.5 kg - 1.0 kg) and 25% were 'extra large' (>1.0 kg);
- Density (see Exhibit 4) –When each search is considered separately (several transects have been searched multiple times), data as of 24 August indicates that when birds were found by BBS teams, one carcass was found 84.2% of the time, two carcasses were found 9.2% of the time, three carcasses 3.3% of the time, and four or more 3.3% of the time.;
- Scavenging state (see Exhibit 5) – When carcass scavenging state was noted by Beached Bird Survey teams, data as of the week of 23 August indicate that approximately 5.9% of carcasses were unscavenged, 41.6% were freshly dead, 20.9% were lightly scavenged; 18.5% were heavily scavenged, 13.1% were mummified or skeletal (scavenging categories are defined in later sections of this document); and
- Position relative to surf (see Exhibit 6) – When the position of the carcass was noted by Beached Bird Survey teams, data as of the week of 23 August indicate that approximately 54.2% of carcasses were discovered in the upper (high tide) area; 21.6 % were found in the wrack, 23.8% in the low area (wash zone), and 0.11% in the middle of the beach.

For Searcher Efficiency study purposes, carcass size, density, scavenging state and position relative to surf were assigned randomly based on the above distributions, adjusted as described in Appendix A SOPs

to reflect the fact that Beached Bird Survey data are for found birds (related to but likely different from 'actual' distributions of carcasses).

Carcasses used for this study will be unoiled. While some bird carcasses with perceptible oiling have been recovered as part of spill-related activities, the Oil Pollution Act of 1990 and other government regulations and policies prohibit the introduction of oiled material (including birds) into the environment. For similar reasons, birds that were euthanized using chemical agents other than inhaled anesthetics will not be utilized, nor will specimens known to be associated with disease-related wildlife-mortality events.

As noted in Appendix A SOPs, all birds used for the Searcher Efficiency study will have a cryptic tag with a unique identification number in a location unlikely to affect visibility to BBS teams (e.g., patagium and upper leg). Bird species, weight, condition for searcher efficiency study, and identification number will be recorded on a 'master list' of birds used for the study. In addition, a small, laminated card will be attached to each carcass identifying it as part of this study. Photographs should be taken of each placed carcass, from approximately 5, 10 and 25 meters away.

Exhibit 3 summarizes (by species and size category) the number of bird carcasses found on a subset of transects as part of spill-associated activities. As shown in the exhibit, the species collected most frequently include brown pelicans, laughing gulls, and northern gannets. Plumage and other characteristics can affect bird suitability for this study. Trustee and BP/ENTRIX representatives will work collaboratively to determine if specific birds available for the project are inappropriate for use, due to coloring or other issues. Because BBS search teams rely on visual spotting of carcasses, the key issue is whether birds are likely to be substantially more or less visible than "naturally occurring" beached birds. If not, they should be considered suitable for use.

All carcasses will be recovered after Beached Bird Survey teams complete study transects. Missing carcasses, if any, will be noted. Beached Bird Survey teams will use their standard protocols for conducting searches, although carcasses purposefully placed for this study will not be collected or photographed by them.

For the purposes of this study, "carcass" is defined as any dead bird regardless of its state (scavenged or unscavenged, oiled or unoiled), which includes remains limited to only a few feathers attached to skin fragments (see Deepwater Horizon (MC 252) Oil Spill Beach Bird Protocol – Field Procedures 2010). Definitions of carcass state (obtained from Deepwater Horizon (MC 252) Oil Spill Beached Bird Protocol – Field Procedures 2010) are provided below:

- **No scavenging** - Carcass is entirely undisturbed;
- **Freshly dead** - Whole carcass with little or no evidence of scavenging; carcass has moved, but is still visible from its original location and had not been scavenged. This level generally reflects the effect of tidal action on the carcass;
- **Lightly scavenged** - Skin broken, some guts removed;
- **Heavily scavenged** - Guts completely eviscerated, breast meat consumed; and
- **Mummified or Skeletal** - Only individual body parts, such as a spine, wings, and/or keel, remain.

The size of Searcher Efficiency carcass deployment teams will be mutually agreed by Trustee and BP/ENTRIX representatives. While use of two person teams (one Trustee, one BP/ENTRIX) is preferable for safety and other reasons, because of the limited time available for the searcher efficiency study

(remaining BBS teams will stand down by the end of September), one person teams can be utilized to deploy and retrieve carcasses, if such activities can be accomplished in a safe manner and is agreed to by Trustee and BP/ENTRIX representatives and the individual who would be working alone. Teams should attempt to minimize evidence of their presence by limiting the amount of activity in the BBS 'search zone'.

4.0 DATA COLLECTION AND ANALYSIS

A copy of the data sheet to be used for the searcher efficiency study is included in the Appendix A SOPs. One data sheet will be completed for each transect included in the searcher efficiency study, and will be filled out on paper, in ink. The general purpose of the searcher efficiency data sheet is to document carcass placement and retrieval and note the corresponding BBS survey team information, which will provide the information on whether placed carcasses were 'found' by BBS teams

At the end of each day, each searcher efficiency data sheet will be signed by the Trustee and BP/ENTRIX representative on each searcher efficiency team and search team photographs of each bird placement (as specified in the relevant SOP) will be downloaded to a computer. Original forms and files will be maintained by the Trustees, copies will be made available to BP/ENTRIX personnel.

Beached bird survey teams will conduct carcass-detection surveys as normal and record data on the standard Beached Bird Survey forms currently in use (see relevant SOP in Appendix A). Teams will be told in advance that tagged carcass study carcasses can be indentified by the presence of a numbered identification tag and study identification card underneath the carcass.

Trustee and BP/ENTRIX representatives will coordinate with BBS supervisors to obtain copies of relevant BBS data forms to determine how many/which searcher efficiency carcasses were 'found' by BBS teams. One copy of each such form will be provided to a designated Trustee searcher efficiency representative, and one to a designated BP/ENTRIX representative. Trustee and BP/ENTRIX representatives will jointly develop a database that combines the data from the searcher efficiency data sheets and relevant portions of BBS data sheets.

After the study is complete, a field and data report will be generated that documents field activities, notes deviations from agreed SOPs (if any), and provides raw data generated by the study. Summary statistics and other calculations (for example, see Byrd et al. 2009) will be included as appropriate. Searcher efficiency rates will be calculated for relevant shoreline strata. Given the relatively low carcass densities observed by beached bird survey teams (i.e., a few carcasses per kilometer), missing even a single bird will have a large impact on search efficiency for that transect. In part for this reason, we expect the field and data report to provide average efficiency calculations across similar types of transects.

5.0 PERMITTING

All permits required to access study locations will be obtained prior to the start of this study. When access to privately held properties is required, landowner permission will be secured. Because Searcher Efficiency teams will be accessing the exact same locations as Beached Bird Survey teams, existing permits/approvals for those activities may suffice for Searcher Efficiency purposes.

6.0 REFERENCES

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Wiese, F.K. and G.J. Roberston. 2003. Assessing seabird mortality from chronic oil discharges at sea. *Journal of Wildlife Management*, 68: 627-638.

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7.0 BUDGET

Searcher Efficiency Project Proposed Budget					Field Team 1		Field Team 2		Field Team 3		
		Donlan	DelVecchio	Brasso	Person A	Person B	Person C	Person D	Person E	Person F	Approx Cost
Task		person days (off site)	person days (off site)	person days (off site)	12 hr field days	12 hr field days	12 hr field days	12 hr field days	12 hr field days	12 hr field days	
1	Protocol Development (already completed)	8	4	12	--	--	--	--	--	--	[redacted]
2	Pre-Trip Project Planning/Logistics	1	2	5	--	--	--	--	--	--	
3	Project Teams (3) On-site Study Preparation	--	--	--	3	3	3	3	3	3	
4	Project Teams (3) Conduct Study	--	--	--	5	5	5	5	5	5	
5	Project Teams (3) Demobilization	--	--	--	1	1	1	1	1	1	
6	Developent of Field and Data Report	3	5	10	--	--	--	--	--		
7	Project Expenses										
	Flights	--	--	--	1	1	1	1	1	1	
	Hotel	--	--	--	9	9	9	9	9	9	
	Per Diem	--	--	--	11	11	11	11	11	11	
	Rental Car	--	--	--	1	--	1	--	1	--	
	Boat Rental				1	--	--	--	--	--	
	Miscellaneous										
8	Project Management/ Administration	3	5	--							
	Total										$

Task Summary Descriptions:

1) 18 August 2010 draft protocol expected to be close to final.
2) Example activities: identifying 3 operations centers; securing equipment/materials, arranging for bird transport; arranging for flights, hotels, vehicles, and boats; obtaining permits.
3) Three teams of 2 people each anticipated (one MS/LA, one AL/western FL, one central FL), example activities include: delivery of birds to command center; preparation of birds; confirmation and reconnaissance of transect locations; coordination with beached bird survey team supervisors/other response personnel, detailed implementation planning.
4) We assume each team covers 10-15 transects, and can implement the study at 2-3 transects per day, given the length of transects (2 km), the distances between study transects, difficulties accessing some transects (e.g., barrier islands), and the need to unobtrusively observe beached bird survey teams to ensure they do not take study carcasses.
5) Close operations centers, dispose of used carcasses, return unused bird carcasses to freezer, return rental equipment, etc.
6) Report will document methods (e.g., study design; size, scavenging state, density, and position relative to surf of carcasses deployed) and results (e.g., statistical analyses, summary statistics, appendices containing raw data).
7) Expenses will include, but not necessarily be limited to: airfare, hotel, vehicle and boat rentals, consumables to transport and prepare birds, temporary rental of space for field operations centers, and effort for overall project management and administration.

EXHIBIT 1. ACTIVELY SEARCHED BEACHED BIRD SURVEY TRANSECTS AS OF SEPTEMBER 21 2010*.

Alabama	Mississippi	Louisiana	Florida
AL-03-01	MS-01-01	LA-75-02	WFL-05-01
AL-06-02	MS-01-07	LA-75-04	WFL-05-04
AL-06-03	MS-05-01	LA-75-06	WFL-06-03
AL-06-05	MS-06-03	LA-76-02	WFL-11-01
AL-07-02	MS-08-01	LA-76-04	WFL-12-01
AL-08-02	MS-08-06	LA-76-06	WFL-12-07
AL-08-04	MS-15-01	LA-77-02	WFL-16-01
AL-18-01	MS-17-02	LA-77-03	WFL-17-02
AL-23-04	MS-20-04	LA-81-01	WFL-20-01
AL-24-02	MS-20-06	LA-82-05	WFL-20-04
AL-24-06	MS-23-01	LA-83-02	WFL-22-03
AL-25-04	MS-23-09	LA-83-04	WFL-25-01
AL-26-02		LA-562-01	WFL-26-02
AL-26-07		LA-562-02	WFL-27-02
AL-27-04		LA-562-03	WFL-28-02
		LA-562-04	
		LA-562-05	
		LA-562-06	
		LA-563-01	
		LA-640-06	
		LA-641-04	
		LA-642-01	
		LA-643-01	
		LA-644-01	
		LA-645-01	

* Transects highlighted in grey were not available for use in the Searcher Efficiency due to access constraints and BBS team schedules; personal communication with Marella Buncick and George Dennis, FWS, BBS team coordinators deployed to the NRDA Bird Office. Complete list of transects to be utilized for the Searcher Efficiency study can be found in SOP: Carcass Numbers, Size, Scavenging Condition, Position and Distance from Start of Transect and geographic location of each transect is found in Appendix B.

EXHIBIT 2. ACTIVE NRDA TRANSECTS (AS OF THE WEEK OF 23 AUGUST 2010) ON WHICH BEACHED BIRD CARCASSES HAVE BEEN FOUND*.

State	Transect ID	# times searched (days)	Total # carcasses	Carcasses detected per search (day)					
				1	2	3	4	5	6
AL	AL-03-01	2	2	1	1				
AL	AL-06-03	1	1	1					
AL	AL-06-05	1	1	1					
AL	AL-07-02	2	2	1	1				
AL	AL-08-04	6	15	1	6	1	2	4	1
AL	AL-08-02	1	1	1					
AL	AL-18-01	3	3	1	1	1			
AL	AL-23-04	4	6	2	1	2	1		
AL	AL-24-02	1	1	5					
AL	AL-25-04	2	6	3	3				
AL	AL-26-02	3	5	2	1	2			
AL	AL-26-07	1	1	1					
FL	WFL-05-04	1	1	1					
FL	WFL-06-03	3	3	1	1	1			
FL	WFL-12-01	1	6	6					
FL	WFL-12-07	2	2	1	1				
FL	WFL-20-04	3	3	1	1	1			
FL	WFL-28-02	1	1	1					
FL	WFL-32-04	1	1	1					
FL	WFL-33-02	1	1	1					
FL	WFL-34-02	1	1	1					
FL	WFL-34-04	2	3	2	1				
FL	WFL-38-03	1	1	1					
FL	WFL-39-04	1	1	1					
FL	WFL-39-07	1	1	1					
FL	WFL-40-03	1	1	1					
FL	WFL-41-03	1	2	1	1				
FL	WFL-41-06	1	1	1					
FL	WFL-42-01	2	2	1	1				
FL	WFL-44-04	2	2	1	1				
FL	WFL-45-03	1	1	1					
FL	WFL-48-02	2	2	1	1				
FL	WFL-51-04	1	1	1					
FL	WFL-53-01	1	1	1					
FL	WFL-56-01	1	1	1					
FL	WFL-56-05	1	1	1					

LA	LA-562-01	1	1	1					
LA	LA-562-04	1	1	1					
LA	LA-563-01	1	1	1					
LA	LA-640-06	1	3	3					
LA	LA-644-01	2	4	3	1				
LA	LA-75-02	1	1	1					
LA	LA-75-04	1	1	1					
LA	LA-76-02	2	2	1	1				
LA	LA-76-04	3	3	1	1	1			
LA	LA-76-06	1	1	1					
LA	LA-77-02	1	1	1					
LA	LA-82-05	1	1	1					
LA	LA-83-02	3	3	1	1	1			
LA	LA-83-04	2	2	1	1				
MS	MS-01-01	1	3	2	1				
MS	MS-01-07	3	4	2	1	1			
MS	MS-05-01	3	3	1	1	1			
MS	MS-06-03	1	1	1					
MS	MS-07-02	1	1	1					
MS	MS-07-04	2	2	1	1				
MS	MS-08-06	2	2	1	1				
MS	MS-12-01	4	4	1	1	1	1		
MS	MS-13-01	1	2	2					
MS	MS-13-03	1	1	1					
MS	MS-13-05	2	2	1	1				
MS	MS-15-01	3	3	1	1	1			
MS	MS-17-02	1	1	1					
MS	MS-18-01	2	3	2	1				
MS	MS-18-03	1	1	1					
MS	MS-20-04	4	5	2	1	1	1		
MS	MS-23-01	3	3	1	1	1			
MS	MS-23-09	2	2	1	1				

* The purpose of these data were to provide an estimate of carcass density on BBS transects (see Exhibit 3). All data presented here should be considered provisional and incomplete.

EXHIBIT 3. SUMMARY OF CARCASSES BY BIRD SPECIES AND SIZE CLASS DETECTED BY BEACHED BIRD SURVEY TEAMS*

Species	Size	Number detected
American White Pelican	XL	1
Brown Pelican	XL	161
Canada Goose	XL	1
Common Loon	XL	23
Double-crested Cormorant	XL	5
Great Blue Heron	XL	16
Masked Booby	XL	1
Northern Gannet	XL	108
Osprey	XL	4
TOTAL X-LARGE		**320 (25.0%)**
Cory's Shearwater	L	1
Great Egret	L	9
Greater Shearwater	L	7
Herring Gull	L	3
Lesser Black-backed Gull	L	1
Magnificent Frigatebird	L	1
Mallard	L	2
Mottled Duck	L	1
Surf Scoter	L	1
White Ibis	L	1
Yellow-crowned Night Heron	L	1
Roseate Spoonbill	L	1
TOTAL LARGE		**29 (2.2%)**
American Oystercatcher	M	3
Black-crowned Night Heron	M	7
Black Skimmer	M	59
Caspian Tern	M	4
Cattle Egret	M	15
Common Moorhen	M	3
Glossy Ibis	M	1
Green Heron	M	3
Laughing Gull	M	552
Little Blue Heron	M	2
Pied-billed Grebe	M	3
Royal Tern	M	82
Snowy Egret	M	11
Tricolored Heron	M	9
TOTAL MEDIUM		**754 (59.0%)**

Audubon's Shearwater	S	29
Black-necked Stilt	S	1
Boat-tailed Grackle	S	1
Clapper Rail	S	6
Commom Tern	S	10
Foster's Tern	S	19
Least Bittern	S	2
Least Tern	S	67
Mourning Dove	S	4
Purple Martin	S	2
Red-winged Blackbird	S	1
Rock Dove (Pigeon)	S	2
Sanderling	S	5
Sandwich Tern	S	22
Seaside Sparrow	S	1
Short-billed Dowitcher	S	1
Willet	S	1
Wilson's Plover	S	1
Yellow-billed Cuckoo	S	1
	TOTAL SMALL	**176 (13.8%)**

* All data should be considered provisional and incomplete. Size classes defined as follows: small (<200g), medium (200-500g), large (500-1,000g), and extra-large (>1000g).

EXHIBIT 4. CARCASS DENSITY REPORTED BY BBS SURVEY TEAMS (BASED ON TRANSECTS ACTIVE AS OF THE WEEK OF 23 AUGUST 2010), WHEN AT LEAST ONE CARCASS WAS FOUND*.

# carcasses found on a transect	# searches resulting in carcass detection	%
1	101	84.2
2	11	9.2
3	4	3.3
4+	4	3.3

* Data summarized from Exhibit 2.

EXHIBIT 5. SCAVENGING STATE OF CARCASSES DETECTED BY BEACHED BIRD SURVEY TEAMS*

Scavenging	# carcasses	Proportion of carcasses	Proportion of carcasses where scavenging noted
No Scavenging	71	4.1	5.9
Freshly Dead	497	28.7	41.6
Lightly Scavenged	250	14.4	20.9
Heavily Scavenged	221	12.8	18.5
Mummified or Skeletal	157	9.1	13.1
Not Evaluated or Unknown	535	30.9	-

*All Data should be considered provisional and incomplete.

EXHIBIT 6. POSITION OF CARCASSES (RELATIVE TO THE SURF) DETECTED DURING BEACHED BIRD SURVEYS*.

Position	# carcasses	Proportion of carcasses
Low (wash zone)	219	23.8
Middle	1	0.11
Upper (high tide)	499	54.2
Wrack	199	21.6

* Data should be considered provisional and incomplete. Data reported here include position of bird when noted on ERDC datasheet and exclude birds where position was not evaluated or was unknown.

APPENDIX A. FINAL SEARCHER EFFICIECY STUDY OPERATING PROCEDURES (SOPS)

Searcher Efficiency SOP: Bird Preparation

1. Bird carcasses that will be used for the searcher efficiency study are currently stored in a freezer at the FWS office in Daphne, AL. A table listing the inventory of birds in this freezer is provided at the end of this SOP.

2. For searcher efficiency evaluation purposes, birds have been separated into four size classes: small (less than 200g), medium (200g-500g), large (500g-1,000g) and extra large (>1,000g). This categorization in part reflects the fact that laughing gulls are the most common bird found (based on ERDC data as of August 24), and many laughing gull carcasses are available in the Daphne freezer. It is our understanding that laughing gulls are typically 200g-500g in size, and so a size class was created to capture them ('medium'). Birds smaller than 200g are assigned to a 'small' category and birds larger than 500g are assigned to 'large' (up to 1kg) and 'extra large' (more than 1kg) categories.

3. In addition to size, other characteristics (e.g., plumage) can affect bird suitability for this study. Trustee and BP/ENTRIX representatives will work collaboratively to determine if specific birds in the Daphne freezer are inappropriate for use, due to coloring or other issues. Because BBS search teams rely on visual spotting of carcasses, the key issue is whether birds are likely to be substantially more or less visible than beached birds. If not, they should be considered suitable for use.

4. Study birds will be assigned to one of two 'condition' categories ('no/lightly scavenged' or 'heavily scavenged'). Birds assigned to the 'no/lightly scavenged' category will be used 'as is' after thawing. Birds assigned to the 'heavily scavenged' category will be gutted, and the insides removed and properly disposed of. Some birds in the freezer may already be in scavenged condition, and so may be appropriate for the 'heavily scavenged' category without additional preparation.

5. All birds will have a cryptic tag with a unique identification number in a location unlikely to affect visibility to BBS teams (patagium and upper leg). Bird species, weight, condition for searcher efficiency study, and identification number will be recorded on a 'master list' of birds used for the searcher efficiency study.

6. A small, laminated card will be attached to each carcass identifying it as part of the "Tagged Carcass Study". The tag will read:

   > **TAGGED CARCASS STUDY, DO NOT** remove bird, **DO NOT** photograph bird, **DO NOT** create GPS waypoint. Record the following at the bottom of your data sheet (DO NOT list this bird in the data table): 1) Bird species, 2) GPS lat/long, 3) Carcass number (tag on wing and leg), 4) Beach position. If questions, please CALL 765-749-4768.

7. Birds to be deployed on a transect the following day will be individually bagged, with the transect number and carcass/placement details (i.e., size category, condition, distance from start of transect and position relative to surf) indicated on the bag. All birds to be deployed at a single transect will be placed in a larger bag/container, with the transect number and number of birds included indicated on the bag.

8. Birds can be reused for multiple transects and will be kept on ice in between use to help prolong their period of use. Birds to be reused will have their original identification tag removed and will be fitted with a new tag and unique identification number. Trustee and BP/ENTRIX representatives will work collaboratively to determine when carcasses are no longer suitable for use.

Daphne Freezer Bird Count 7/27/2010

Species	Count
Loon	1
Red Shouldered Hawk	1
Merganzers	4
Cattle Egret	1
Pelican	2
Osprey	1
Black Skimmer adult*	1
Black Skimmer chick	6
Laughing gull chicks	4
American oystercatcher chicks	2
Clapper rail chick	1
Least tern	1
storm petrel	1
Royal tern chick	1
Shearwater	1
Cormorant	1
Green Winged Teal	15
Wood Duck	8
Limpkin?	1
Mallard	1
laughing gulls	119
herring/gbb gulls	102
Doves	7
Woodpeckers	4
Duck	1
Tern	1
Small Duck	1
	289

Searcher Efficiency SOP: Carcass Numbers, Size, Scavenging Condition, Position and Distance from Start of Transect

1. Table 1 at the end of this SOP identifies carcass numbers, size, scavenging condition, position, and distance from the transect start for each transect used for searcher efficiency evaluation purposes.

2. Carcass placements were determined using a randomization process, using distributions developed from data available in the ERDC database as of August 24, 2010, modified as described below.

3. Number of carcasses found per transect search: ERDC data as of August 24 indicate that when birds were found by BBS teams, one carcass was found 84.2% of the time, two carcasses were found 9.2% of the time, three carcasses 3.3% of the time, and four or more 3.3% of the time. To address the likelihood that some birds were deposited on beaches but not found by BBS teams, we have adjusted the proportions as follows: approximately 15% of transects will have two carcasses, 51% will have three carcasses, 7% will have four carcasses, and 27% will have five carcasses. Carcass numbers were randomly assigned to each transect using this distribution. Each transect was assigned between two and five carcasses.[2]

4. Carcass size: ERDC data as of August 24 indicate that 13.8% of carcasses found were 'small' (<0.2 kg), 59% were 'medium' (0.2 kg – 0.5 kg), 2.2% were 'large' (0.5 kg - 1.0 kg) and 25% were 'extra large' (>1.0 kg). Carcass sizes were randomly assigned to each transect using this distribution.

5. Scavenging condition: ERDC data as of August 24 indicate that approximately 5.9% of carcasses were unscavenged, 41.6% were freshly dead, 20.9% were lightly scavenged; 18.5% were heavily scavenged, 13.1% were mummified or skeletal. For searcher efficiency purposes, we have combined unscavenged, freshly dead, and lightly scavenged categories into a single 'no/lightly scavenged' category, in recognition of the likelihood that differences between those categories will not affect searcher efficiency. In addition, because we do not expect to be able to prepare searcher efficiency birds to resemble a 'mummified/skeletal' condition, that category is excluded. Thus, searcher efficiency birds will be in one of two conditions: a) 'no/lightly scavenged' (frozen birds simply thawed, no cutting needed); and b) 'heavily scavenged' (frozen birds will be thawed and gutted) and carcasses were randomly assigned to each scavenging condition using a distribution of 68.4% no/lightly scavenged and 31.6% heavily scavenged.

6. Position: ERDC data as of August 24 indicate that approximately 54.2% of carcasses were discovered in the upper (high tide) area; 21.6 % were found in the wrack, 23.8% in the low area (wash zone), and 0.11% in the middle of the beach. Because searcher efficiency may be lower in the wrack relative to the other areas, we increased its relative proportion for this

[2] The proportions described here represent the intended distribution of carcasses across all 39 transects utilized in this study. Due to logistical constraints presented in the field, some numbers may change; therefore, these values should be considered preliminary and will be proofed against field data sheets when that information becomes available.

study. Carcass positions were randomly assigned to each transect using a distribution of 50% (upper intertidal), 30% (wrack) and 20% (lower intertidal).

7. Distance from start of transect: Distances were randomly assigned, based on the understanding that transects are 2km long, but without knowledge of the site conditions at the exact location indicated by the target distance. Therefore, distances may be adjusted slightly in the field if necessary.

Table 1. Carcass placement descriptions for each transect.

Bird ID	Transect ID	# carcasses	Size	Scavenging	Position	Distance from start of transect (m)
46	AL-03-01	2	x-large	heavy	upper	1869
47	AL-03-01		medium	heavy	wrack	1419
43	AL-06-03	3	x-large	no/light	wrack	1474
44	AL-06-03		medium	heavy	upper	964
45	AL-06-03		x-large	no/light	wrack	351
56	AL-06-05	5	x-large	heavy	wrack	1574
57	AL-06-05		medium	no/light	upper	672
58	AL-06-05		medium	no/light	low	1400
59	AL-06-05		medium	heavy	upper	313
60	AL-06-05		medium	no/light	upper	1272
36	AL-07-02	3	medium	heavy	low	580
37	AL-07-02		large	no/light	low	799
38	AL-07-02		small	no/light	upper	1214
48	AL-08-02	3	x-large	no/light	upper	1731
49	AL-08-02		x-large	no/light	upper	1592
50	AL-08-02		medium	no/light	upper	282
61	AL-08-04	5	small	no/light	upper	1420
62	AL-08-04		medium	no/light	wrack	850
63	AL-08-04		medium	heavy	low	402
64	AL-08-04		x-large	no/light	wrack	539
65	AL-08-04		medium	no/light	upper	694
51	AL-18-01	5	x-large	no/light	upper	1097
52	AL-18-01		small/med	no/light	low	1368
53	AL-18-01		medium	no/light	wrack	596
54	AL-18-01		medium	no/light	upper	733
55	AL-18-01		medium	no/light	wrack	1308
69	AL-23-04	3	medium	no/light	upper	644
70	AL-23-04		medium	heavy	upper	987
71	AL-23-04		medium	no/light	wrack	925

72	AL-24-02	5	x-large	no/light	low	1379
73	AL-24-02		medium	no/light	low	1401
74	AL-24-02		medium	no/light	upper	513
75	AL-24-02		x-large	no/light	upper	147
76	AL-24-02		medium	no/light	upper	723
77	AL-25-04	2	x-large	heavy	upper	1502
78	AL-25-04		medium	no/light	wrack	532
24	AL-26-02	2	medium	no/light	wrack	1389
25	AL-26-02		small	no/light	upper	750
79	AL-26-07	2	x-large	no/light	low	175
80	AL-26-07		x-large	heavy	low	528
81	AL-06-02	2	medium	no/light	low	704
82	AL-06-02		medium	no/light	wrack	527
83	AL-24-06	2	medium	no/light	wrack	1330
84	AL-24-06		small	no/light	wrack	442
85	MS-08-06	3	medium	no/light	wrack	1429
86	MS-08-06		medium	heavy	low	1130
87	MS-08-06		x-large	no/light	upper	244
88	MS-20-06	2	medium	heavy	low	1348
89	MS-20-06		medium	no/light	upper	907
90	MS-08-01	3	x-large	no/light	upper	1696
91	MS-08-01		medium	no/light	low	989
92	MS-08-01		medium	heavy	upper	660
93	MS-15-01	3	x-large	no/light	upper	495
94	MS-15-01		small	no/light	wrack	255
95	MS-15-01		medium	heavy	upper	465
96	MS-17-02	3	medium	no/light	upper	1412
97	MS-17-02		medium	no/light	low	1802
98	MS-17-02		x-large	heavy	low	344
99	MS-20-04	3	small	no/light	upper	1674
100	MS-20-04		small	heavy	wrack	1445
101	MS-20-04		medium	heavy	wrack	659
102	MS-23-01	3	medium	no/light	upper	511
103	MS-23-01		medium	heavy	upper	1343
104	MS-23-01		medium	no/light	wrack	168
105	MS-23-09	3	small	heavy	upper	353
106	MS-23-09		medium	heavy	upper	1648
107	MS-23-09		medium	no/light	upper	1444
108	LA-562-01	5	medium	heavy	low	240
109	LA-562-01		medium	heavy	wrack	515
110	LA-562-01		small	no/light	upper	944

111	LA-562-01		medium	no/light	upper	1451
112	LA-562-01		small	no/light	wrack	388
113	LA-563-01	3	x-large	heavy	upper	1782
114	LA-563-01		medium	heavy	wrack	1536
115	LA-563-01		medium	no/light	low	1128
1	LA-640-06	3	medium	no/light	upper	1709
2	LA-640-06		medium	no/light	wrack	622
3	LA-640-06		medium	no/light	wrack	1238
4	LA-644-01	3	medium	heavy	wrack	1261
5	LA-644-01		medium	heavy	wrack	269
6	LA-644-01		medium	no/light	upper	1856
122	LA-75-02	5	medium	no/light	low	226
123	LA-75-02		medium	heavy	upper	1520
124	LA-75-02		medium	no/light	low	952
125	LA-75-02		medium	heavy	low	1649
126	LA-75-02		medium	no/light	wrack	1869
127	LA-75-04	4	medium	no/light	upper	900
128	LA-75-04		medium	no/light	upper	164
129	LA-75-04		x-large	no/light	wrack	903
130	LA-75-04		x-large	no/light	upper	1581
131	LA-76-02	5	medium	no/light	upper	1691
132	LA-76-02		medium	no/light	upper	1150
133	LA-76-02		medium	no/light	upper	1851
134	LA-76-02		x-large	heavy	upper	874
135	LA-76-02		medium	no/light	wrack	836
136	LA-76-04	3	medium	no/light	wrack	535
137	LA-76-04		medium	heavy	low	947
138	LA-76-04		medium	no/light	upper	1899
139	LA-76-06	5	small	no/light	upper	242
140	LA-76-06		small	no/light	low	830
141	LA-76-06		medium	no/light	wrack	1074
142	LA-76-06		medium	no/light	upper	1651
143	LA-76-06		x-large	no/light	wrack	1882
144	LA-82-05	2	medium	no/light	low	132
145	LA-82-05		medium	no/light	upper	371
146	LA-83-02	4	medium	heavy	upper	520
147	LA-83-02		small	heavy	wrack	1268
148	LA-83-02		x-large	no/light	low	1153
149	LA-83-02		medium	heavy	upper	478
150	LA-83-04	5	small	no/light	upper	1178
151	LA-83-04		small	no/light	upper	928

152	LA-83-04		x-large	no/light	upper	1597
153	LA-83-04		medium	heavy	upper	511
154	LA-83-04		medium	no/light	wrack	1662
155	LA-81-01	5	medium	heavy	low	1657
156	LA-81-01		small	heavy	wrack	836
157	LA-81-01		medium	heavy	upper	1585
158	LA-81-01		x-large	no/light	low	1865
159	LA-81-01		small	heavy	low	399
160	LA-75-06	3	x-large	no/light	upper	1093
161	LA-75-06		large	no/light	upper	762
162	LA-75-06		medium	no/light	upper	282
163	LA-77-03	3	medium	no/light	upper	1105
164	LA-77-03		medium	heavy	upper	289
165	LA-77-03		large	heavy	low	1062
166	LA-562-03	4	x-large	no/light	wrack	225
167	LA-562-03		x-large	no/light	upper	838
168	LA-562-03		medium	no/light	upper	1559
169	LA-562-03		x-large	heavy	upper	220
170	LA-562-02	3	medium	heavy	upper	560
171	LA-562-02		medium	heavy	upper	664
172	LA-562-02		medium	no/light	wrack	586
7	LA-641-04	4	medium	no/light	upper	1014
8	LA-641-04		medium	heavy	low	971
9	LA-641-04		x-large	heavy	wrack	1808
10	LA-641-04		small	no/light	upper	985
11	LA-642-01	2	x-large	no/light	low	447
12	LA-642-01		medium	no/light	upper	410
13	LA-643-01	2	medium	no/light	low	608
14	LA-643-01		x-large	no/light	wrack	850
15	LA-645-01	2	medium	heavy	upper	615
16	LA-645-01		medium	no/light	upper	737
17	WFL-28-02	3	x-large	no/light	upper	333
18	WFL-28-02		medium	heavy	upper	721
19	WFL-28-02		medium	heavy	upper	353
20	WFL-22-03	3	medium	heavy	upper	1413
21	WFL-22-03		x-large	heavy	upper	1231
22	WFL-22-03		medium	no/light	upper	1276
23	WFL-25-01	3	medium	no/light	wrack	1458
26	WFL-25-01		medium	no/light	low	832
27	WFL-25-01		medium	no/light	upper	1246
28	WFL-26-02	3	small	heavy	upper	1403

36	WFL-26-02		x-large	no/light	wrack	1217
37	WFL-26-02		x-large	no/light	upper	982
38	WFL-27-02	5	medium	no/light	upper	1167
39	WFL-27-02		small	no/light	upper	966
40	WFL-27-02		small	no/light	upper	1427
41	WFL-27-02		small	no/light	low	405
42	WFL-27-02		small	no/light	wrack	1675

Searcher Efficiency SOP: Deployment & Retrieval of Carcasses by Searcher Efficiency Teams

1. The size of deployment teams will be mutually agreed by Trustee and BP/ENTRIX representatives. While use of two person teams (one Trustee, one BP/ENTRIX) is preferable for safety and other reasons, because of the limited time available for the searcher efficiency study (remaining BBS teams will stand down by the end of September), one person teams can be utilized to deploy and retrieve carcasses, if such activities can be accomplished in a safe manner and is agreed to by Trustee and BP/ENTRIX representatives and the individual who would be working alone.

2. Ideally, teams will deploy carcasses a few hours before BBS teams are scheduled to search that transect. Particularly for transects that will have birds deployed in the wash zone, tidal timing should be considered. Trustee and BP/ENTRIX representatives will discuss and agree to the following day's deployment schedule.

3. Many of the active transects can be accessed by car/walking. Some will require boat or ATVs. Search teams will need to coordinate in advance with searcher efficiency project team personnel to secure appropriate transportation.

4. Deployment teams will obtain the container/bag of bird carcasses prepared for use on specified transects (see SOP for bird preparation). The teams will confirm (using the labels on the larger bags and individual bird bags) that the carcass number, size, condition, and placement location information is consistent with those specified in the SOP for carcass placement.

5. Deployment teams will use GPS to place birds at the distance from the start of the transect specified on each individual bag containing a carcass. Teams should attempt to minimize evidence of their presence by limiting the amount of activity in the BBS 'search zone' (see below).

6. Deployment teams will place carcasses at 'wrack', 'upper' and 'lower' positions on the beach. The overall intent is to place birds in a natural, realistic manner. If photographs of carcasses found by BBS teams can be reviewed, and/or BBS search team managers interviewed, the following procedures should be modified as warranted. Field procedures for BBS teams specify that BBS search areas are defined as "the beach from the water line up to 5 meters above the wrack line (the collection of organic debris deposited by the previous high tide) or, for very narrow beaches, the transition from beach to other habitat (e.g., saltmarsh, mangrove, etc.)." Birds specified for 'upper' or 'lower' placement should be placed in the upper or lower intertidal portion of the search area. During the trial run, sampling teams agreed that carcasses should be placed 'naturally', meaning slightly pushed down into the sand with some sand sprinkled on them. Carcasses should not be buried, nor should they be propped up on top of sand. Similarly, birds specified for 'wrack' placement should be placed in a similar manner on sand next to wrack debris, neither propped up nor buried by the wrack. As noted below, photographs of each carcass placement will be taken.

7. If no/very little wrack is present at the specified distance from the transect start, search teams should place the carcass at the nearest area with wrack. If no wrack is present within 100 meters (in either direction) of the originally specified location, the team will place the carcass at the high tide line at the originally specified distance from the start of transect. Any changes in carcass placement from the original specification (e.g., moved to a nearby area with wrack or placed in a non-wrack location due to the absence of wrack) will be clearly noted on the data sheet.

8. If a 'wrack' placement is changed to 'non-wrack' due to the absence of wrack on a transect, a corresponding, reverse change (i.e., 'non-wrack' to 'wrack') will be made, as feasible, on one of the next day's transects in an effort to compensate.

9. Efforts should be undertaken to minimize the potential rewash of carcasses due to tidal action. As feasible, carcasses will be placed during a falling tide, within a few hours of BBS team searches. Lower intertidal placements are at greatest risk of rewash. If, given the timing of tides and BBS team surveys, Trustee and BP/ENTRIX representatives agree a lower intertidal placement would likely be rewashed, a high intertidal placement will be substituted. As feasible, a reverse substitution will be made on one of the next day's transects (i.e., higher intertidal changed to lower intertidal).

10. The latitude and longitude of placed carcasses should be noted on data sheets provided to the teams, along with carcass identification number, size class, scavenging condition, estimated distance from start of transect, time of placement and position relative to surf.

11. Three photographs should be taken of each placed carcass, from approximately 5, 10 and 25 meters away. No zoom should be used.

12. Deployment teams should return to transects as soon as feasible after the BBS search team has completed its survey to retrieve carcasses. Efforts must be made to retrieve every carcass, and the outcome (retrieved or not retrieved) must be noted on searcher efficiency data sheets.

13. If possible, searcher efficiency teams should call BBS teams after they have finished surveying each transect to find out which tagged birds the BBS team found and to make sure they have completed the transect. Then searcher efficiency teams will be able to retrieve searcher efficiency carcasses.

Searcher Efficiency SOP: Data Collection

1. A copy of the data sheet to be used for the searcher efficiency study is included as Exhibit 1 to this SOP. One data sheet will be completed for each transect included in the searcher efficiency study, and will be filled out on paper, in ink.

2. The general purpose of the searcher efficiency data sheet is to document carcass placement and retrieval and note the corresponding BBS survey team information, which will provide the information on whether placed carcasses were 'found' by BBS teams (see below).

3. At the end of each day, each searcher efficiency data sheet will be signed by the Trustee and BP/ENTRIX representative on each searcher efficiency team. Original data sheets will remain in the possession of the Trustee counterpart of each searcher efficiency team until the team has completed their assigned transects. The BP/ENTRIX representative on each team will be provided the opportunity to photograph each data sheet at the end of the day. At the end of the study, the original data sheets will be provided to a designated Trustee representative. The Trustee representative will scan all data sheets onto CDs; one set of CDs will be mailed to a designated BP/ENTRIX representative (under appropriate Chain of Custody) and one set to IEc. The original datasheets will be archived

4. At the end of each day search team photographs of each bird placement (as specified in the relevant SOP) will be downloaded to a computer, and given a name using the following convention: the first symbols will be the letters "SEStudy" followed by an underscore; the next symbols will be the Transect number used by BBS teams followed by an underscore; the next symbols will be the bird identification number given to the carcass followed by an underscore; the next symbols will be the date of placement using 'mm-dd-yy' format followed by an underscore; and the last symbols will be '5', '10' or '25' for the photos taken approximately 5, 10 and 25 meters from the carcass, respectively. At the end of the study, electronic copies will be made and a full set of photos will be provided to a designated Trustee and a designated BP/ENTRIX representative.

5. Due to logistical constraints and considering the intention of keeping the BBS teams uninformed on whether searcher efficiency trials are being conducted on their transects, it may not be possible to obtain from the BBS teams on a daily basis their results in finding the seeded carcasses. Therefore, the column on the searcher efficiency data sheet titled "detected by BBS team?" will be filled out after the completion of the field work based on the data provided on the BBS data sheets. As is the general practice for BBS teams, all of their original data sheets are archived by the FWS; a Trustee representative will gain access to copies of these BBS data sheets for purposes of completing the searcher efficiency study data sheets, and copies of the BBS data sheets will also be provided to BP/ENTRIX and IEc.

6. Exhibit 2 to this SOP provides a copy of the data sheet used by BBS teams. SEARCHER EFFICIENCY PERSONNEL WILL NEED TO COORDINATE CLOSELY WITH BBS TEAM SUPERVISORS. BBS team personnel will be asked to record the location of 'searcher efficiency' carcasses (clearly denoted by a tag with identification number and the presence of a laminated card beneath the carcass noting it is a part of the 'tagged carcass study'). In the 'Field Comments' section, at the bottom of the BBS data sheet, or on the back of the BBS

data sheet, BBS team members should note 'tagged carcass' and provide the identification number on the identification tag. SEARCHER EFFICIENCY CARCASSES WILL NOT BE PHOTOGRAPHED BY BBS TEAMS, TO AVOID POTENTIAL 'CONTAMINATION' OF THE DIGITAL PHOTO EVIDENCE STREAM.

7. UNDER NO CIRCUMSTANCES WILL SEARCHER EFFICIENCY CARCASSES BE INCLUDED IN THE BBS 'FOUND BIRD' EVIDENCE STREAM. BBS teams will leave searcher efficiency carcasses where the find them, for later retrieval by searcher efficiency teams. BBS teams will be briefed by the BBS leader prior to the start of the Searcher Efficiency study as an additional measure to ensure searcher efficiency carcasses do not end up in the evidence stream. Teams will be alerted to the fact that a "tagged carcass study" (a.k.a., "orange sticker/tag study") is being implemented on some of their BBS transects.

8. Trustee and BP/ENTRIX representatives will coordinate with BBS supervisors to obtain copies of relevant BBS data forms to determine how many/which searcher efficiency carcasses were 'found' by BBS teams. One copy of each such form will be provided to a designated Trustee searcher efficiency representative, and one to a designated BP/ENTRIX representative.

Exhibit 1: Searcher Efficiency Data Sheet

Deepwater Horizon (MC 252) Page ____ of _____

SEARCHER EFFICIENCY STUDY DATA SHEET

Please: only one carcass detection survey per form

Date:_____ Searcher efficiency investigators (Print AND Sign names):_____

BBS Team # (that will conduct beach search):_____

BBS Datasheet ID # for associated beached bird survey form:_____

Segment Surveyed (and State):_____ Segment begin[5]: Lat:_____ Long:_____

Start time for carcass placement:____ End time:____ Segment end[5]: Lat:_____ Long:_____

Total # carcasses placed in segment:_____

Carcass ID #	Size[1]	Carcass state[2]	Species	Position[3]	Latitude[4]	Longitude[4]	Placement Time	Carcass detected by BBS team?	Carcass recovered by Searcher Efficiency team?	ID of Photos Taken at		
										5m	10m	25m

Notes/comments:

[1] small (S), medium (M), large (L), or x-large (XL)

[2] state of original carcass (no/light scavenged (NS) or heavily scaveneged (HS))

[3] position relative to surf, indicate one: low (wash zone), upper (high tide), or wrack

[4] All Lat/Long decimal degrees, WGS 84

[5] Lat/long of original BBS segment for geographical reference

Exhibit 2: BBS Data Sheet

Deepwater Horizon (MC 252) Page ____ of ____

BIRD SEARCH EFFORT and BIRDS COLLECTED DATA FORM

Please: Only one beach/marsh/mangrove segment per form. Complete form even if no birds are collected. INV:

EVIDENCE SEIZURE TAG NUMBER: _____ Circle one: NRDA Wildlife Ops Evidence Custodian

Date: _____ Survey Crew Members (Print AND Sign Names): _____ Contact Info: _____

Segment Name (or State) _____ Segment Begun[1]: Lat: _____ Long: _____ GPS WP#____
(or geographic landmark)

_____ Length of surveyed segment (km) _____ % of segment surveyed (approximate) Segment End[1]: Lat: _____ Long: _____ GPS WP#____
(or geographic landmark)

Survey Mode[2] _____ Survey: 1 pass or roundtrip (*circle one*) Wind Speed (mph)/Direction: _____ Start Time (24-hour clock): _____ End Time: _____

Disposition[3]: _____

DEAD BIRDS COLLECTED *(one bird per line; use additional sheets if necessary)*

Species[4]	GPS Lat/Long[1] (dd.mmmmmm°)	ID#[5]	Time (24-hour)	Beach Position[6]	Oiling[7]	Scav[8]	Age[9]	Field Photo (ID No.)	Field Comments	EC Photo (ID No.)	Evidence Custodian Comments

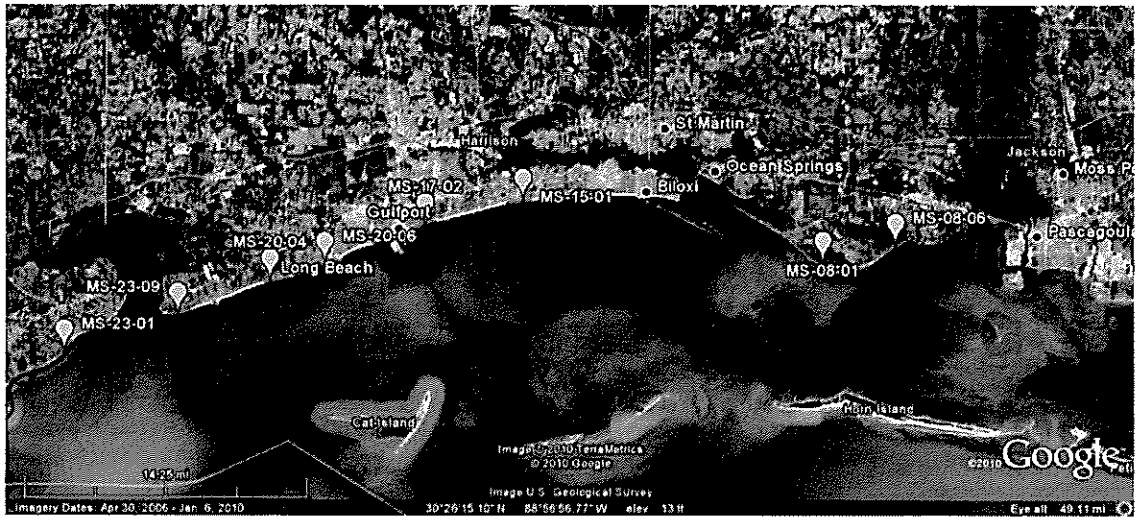
[1] **All Lat/Long:** Decimal degrees, WGS 84
[2] **Survey Mode:** F = Foot, A = Airboat, B = Boat, V = Vehicle, O = Other (specify)
[3] **Disposition** = Intake center where bird was transferred; **Buras, LA; Gulfport, MS; Theodore, AL; Pensacola, FL; or Other (please specify)**
[4] **Species:** Common name, **"UNK"** for unknown, **"NONE"** if no birds found
[5] **ID#:** Consecutive numbers on the data sheet that are transferred to blue evidence tag attached to each bird.
[6] **Position relative to high tide line:** U = Upper (above wrack line) W = Wrack, L = Low (wash zone)
[7] **Oiling:** NONE = not visibly oiled, Trace = ≤5% of body, Light = 6-20% of body, Moderate = 21-40% of body, Heavy = >40% of body
[8] **Scavenging:** F = freshly dead whole carcass with little or no scavenging, L = lightly scavenged, H = heavily scavenged, M = mummified or skeletal, X = not evaluated
[9] **Age:** HY = Hatch Year, JUV = Juvenile, AD = Adult, **"UNK"** for unknown

Database Form ID: _____
Database entry by (print and sign): _____ Date Entered: _____

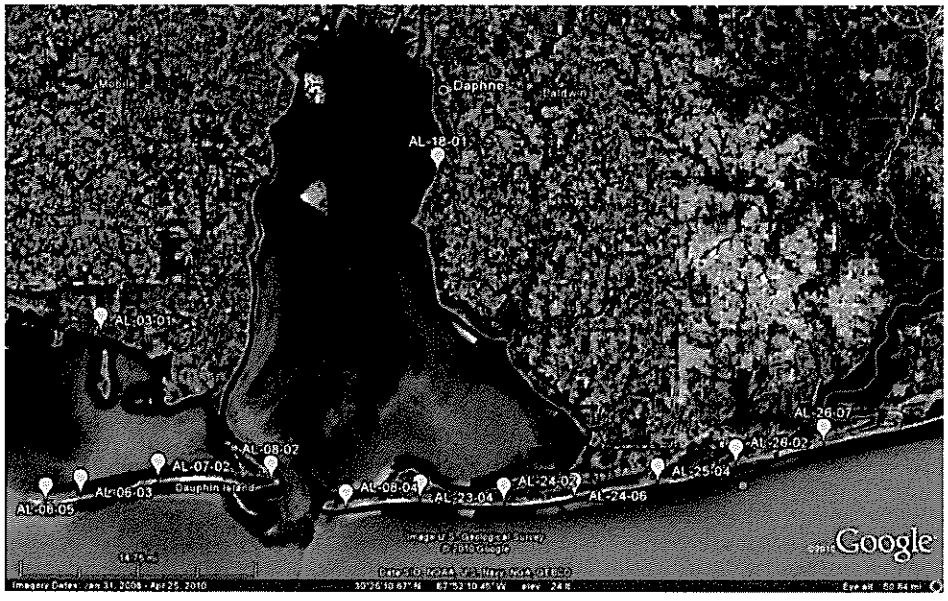
Revised 14Jul10

APPENDIX B. MAPS OF BEACHED BIRD SURVEY TRANSECTS TO ASSIST WITH PLANNING FOR THE SEARCHER EFFICIENCY STUDY[3]

MAP 1. Mississippi. Green tags indicate the location of active BBS transects; red lines represent the 2-km path of each transect.



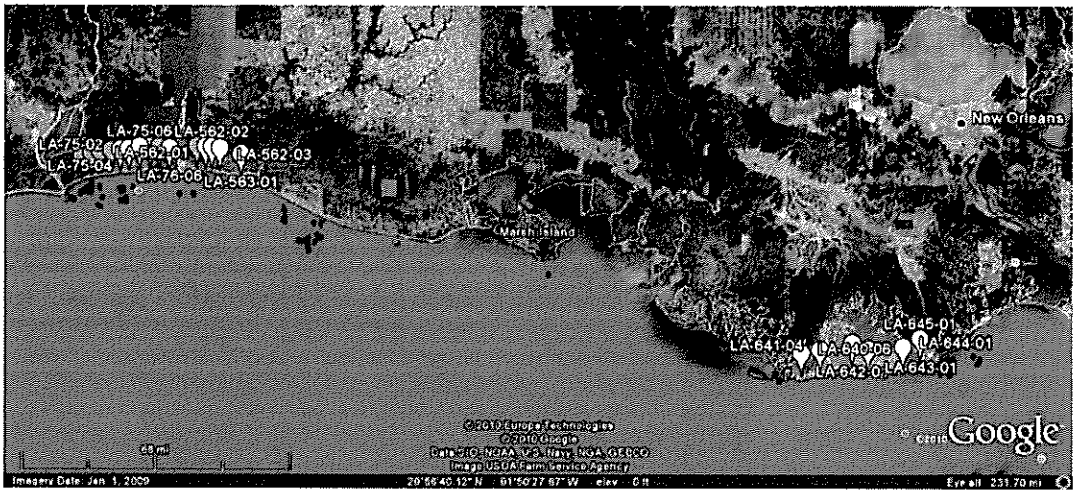
MAP 2. Alabama. Light blue tags indicate the location of active BBS transects; red lines represent the 2-km path of each transect.



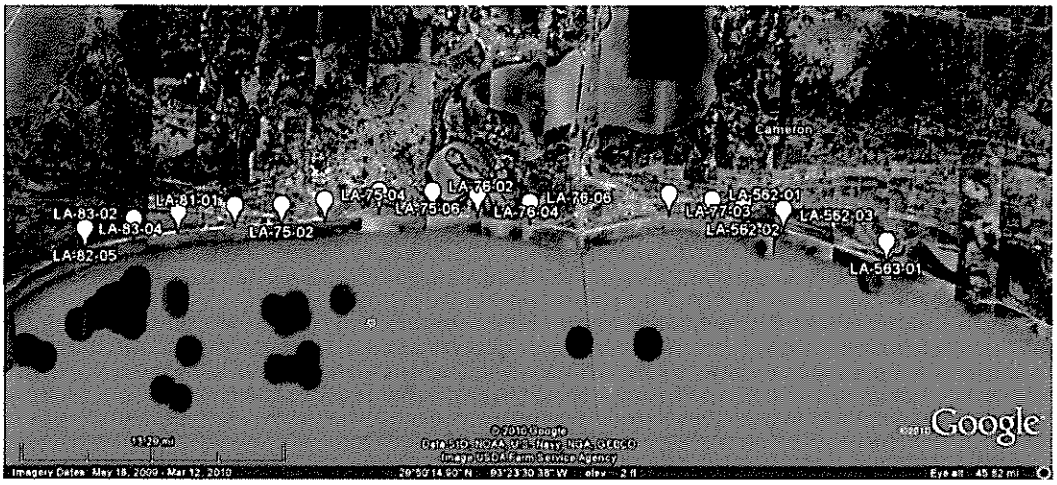
[3] The final list of transects utilized for the Searcher Efficiency study will be included in the field and data report generated after study completion.

MAP 3. Florida. Pink tags indicate the location of active BBS transects; red lines represent the 2-km path of each transect.

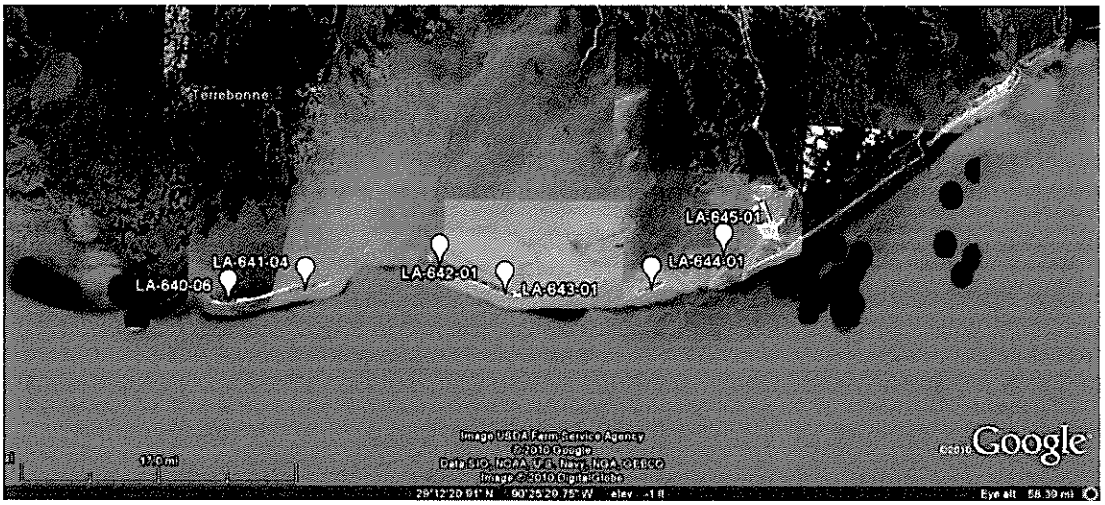
MAP 4. Louisiana. White tags indicate the location of active BBS transects; red lines represent the 2-km path of each transect.



Zoomed in to western Louisiana transects.



Zoomed in to Grand Isle transects



SIGNATURE PAGE
Mississippi Canyon 252

WORK PLAN: DETECTION PROBABILITY (SEARCHER EFFICIENCY)(STUDY 1B)
OCTOBER 12, 2010

Approval of this Preassessment plan for Detection Probability (Searcher Efficiency) Bird Study #1B) is for the purposes of obtaining data for the Natural Resource Damage Assessment. Each party reserves its right to produce its own independent interpretation and analysis of any data collected pursuant to this work plan.

This plan will be implemented consistent with existing trustee regulations and policies. All applicable state and federal permits must be obtained prior to conducting work.

APPROVED:

Ken D. Reynolds 8/22/12
Department of the Interior Trustee Representative: Date

9/18/12
Louisiana Trustee Representative: Date

9/18/2012
BP Representative: Date

Note: This Plan was implemented in the Fall of 2010. No changes to the Plan were made at the time of signature.