

**NATURAL RESOURCE DAMAGE ASSESSMENT
WORK PLAN FOR ASSESSING BIRD MORTALITY
USING DATA FROM RESPONSE OPERATIONS AND BOAT-BASED
NRDA SURVEYS IN THE NORTHERN GULF OF MEXICO NEAR
THE MISSISSIPPI CANYON 252 OIL SPILL**

(Bird Study #19)

**Prepared by the Trustee Bird Technical Working Group
On behalf of the Mississippi Canyon 252 Oil Spill Trustees**

First submitted October 20, 2011

Final 2012

1.0 INTRODUCTION

The Deepwater Horizon/Mississippi Canyon 252 (DWH) Oil Spill (Oil Spill) began on April 20, 2010 in the Gulf of Mexico off the Louisiana coastline and continued into mid-July, 2010. Thousands of bird carcasses were found in beach and marsh habitats during and after this time period, especially in July and August, 2010. Seabirds, colonial waterbirds, shorebirds, and waterfowl are particularly susceptible to exposure from oil at sea and on land. Natural Resource Trustees (Trustees) are authorized under the Oil Pollution Act (33 U.S.C. 2701 *et seq.*) to assess natural resource damages associated with injuries caused to natural resources by discharges of oil. The Natural Resource Trustees (Trustees) for this oil spill with interest in birds include the U.S. Fish and Wildlife Service (Service), the National Park Service, and the States of Texas, Louisiana, Mississippi, Alabama, and Florida.

The Trustees developed several Natural Resource Damage Assessment (NRDA) work plans to evaluate potential Oil Spill-related injuries to different avian guilds. Initial work plans, such as Bird Study #1 and Supplements A-D (*Work Plan for Estimating Mortality of Birds Using Beached Bird Surveys in the Gulf of Mexico Near the Mississippi Canyon 252 Oil Spill* [Beached Bird Study]), were designed to estimate bird mortalities related to the spill through surveys conducted in beach habitats. Given the systematic random sampling design of the Bird Study #1, mortality estimates associated with the Beached Bird model can be extrapolated to most developed and undeveloped mainland and barrier island beaches. However, initial review of data indicates that bird carcasses recovered during DWH operations conducted outside of NRDA work plans, e.g., law enforcement, wildlife operations, and other response activities (Response), represent approximately 90% of the total recoveries following the Oil Spill. During Response activities, live oiled birds were also observed and collected in marsh habitats. Response data are therefore essential for refining overall estimates of spill-related bird mortality. In addition, because differences between beach and marsh habitats may affect a searcher's ability to detect carcasses, investigation of carcass detection and persistence rates specifically for marsh habitats will enable the Trustees to refine mortality estimates.

The focus of this work plan, *Natural Resource Damage Assessment Work Plan for Assessing Bird Mortality Using Data From Response Operations and Boat-Based NRDA Surveys in the Northern Gulf of Mexico Near the Mississippi Canyon 252 Oil Spill (Bird Study #19)* (work plan) is to derive mortality estimates for habitats including vegetated edges (robust emergent vegetation) of bays, estuaries, and marshes accessible by motorized boat, and sandbars or other "strandland" within the estuarine environment that are not being addressed by Bird Study #1. Activities described within this work plan will identify, review, collect and assess data collected beyond the scope of previous DWH NRDA bird studies. Results of these efforts will complement those from other NRDA bird study plans, helping to refine overall estimates of avian mortality associated with the Oil Spill.

Activities within this work plan are divided into two main objectives:

- 1) *Identify and compile DWH Response data appropriate for refining DWH spill-related bird mortality not addressed by NRDA-specific studies; and,*
- 2) *Estimate carcass detection (also referred to as searcher efficiency) and persistence rates in spill-affected areas beyond the scope of Bird Study #1 through the implementation of field studies.*

Objective 1: Due to logistical constraints during the height of Response activities (summer 2010), systematic NRDA carcass surveys focused on walkable beaches. However, the majority of oiled live and dead birds were collected by Response personnel in oil-impacted marshes. Objective 1 under this work plan is designed to guide the compilation and evaluation of Response data to help develop an estimate of total mortality during the period of the Oil Spill for areas not being addressed by Bird Study #1. These data will be used in conjunction with data collected through NRDA field studies on carcass detection and persistence rates described in Objective 2 below.

Objective 2: The Beached Bird Model, utilized in Bird Study #1, is effective and appropriate for estimating avian mortality in areas of walkable beaches. Coastal Louisiana marsh habitats, however, primarily consist of non-walkable marsh edge shoreline. Response activities and Bird Study #10 (*Work Plan for Estimating Wintering Waterfowl Oiling and Mortality*) produced bird carcass deposition data from both habitats, but concentrated on marshes. Estimating total Oil Spill-related avian mortalities from carcass recovery numbers requires estimating the fraction of carcasses missed by observers. Carcasses may not be enumerated because of 1) incomplete spatial coverage of the affected area; 2) less than 100 percent carcass detection (Byrd and Reynolds 2006, Byrd et al. 2009); and 3) scavenging and other losses of carcasses prior to and between carcass surveys (carcass persistence).

Carcass detection rates vary with a range of local factors, making it preferable to document detection rates on a site-specific basis (Van Pelt and Piatt 1995, Flint and Fowler 1998, Ford 2006, Byrd et al. 2009). The detection of carcasses in marsh edge environments is likely to differ substantially from beach habitats. Carcasses or moribund birds may be difficult to detect in the concealing vegetation of the shoreline. A marsh edge detection rate for this area can reduce uncertainty in mortality estimates. Bird Study #11 (*Estimating Carcass Detection in Priority Waterfowl Habitats Impacted by the Deepwater Horizon MC253 Oil Spill*), a time-critical NRDA feasibility study, was implemented primarily to guide injury assessment methodologies for use in Bird Study #10 and to confirm that, under ideal circumstances, carcasses could be detected from boat platforms in dense marsh habitats. Additional refinement of carcass detection rates in marsh habitats will to address search-specific conditions (i.e., search platform, representative carcass densities and sizes, etc).

Carcass persistence rates are also known to vary substantially among sites (Ford 2006). Scavenging is most often cited as the primary cause of carcass removal from beaches after a mortality event (Byrd et al. 2009, Ford and Zafonte 2009, Ford 2006, Ford et al. 2002, Flint and Fowler 1997, Van Pelt and Piatt 1995). However, persistence rates may be affected by season,

location, habitat type, carcass size, scavenger abundance, scavenger type, weather, tidal conditions and other factors (Byrd et al. 2009, Ford and Zafonte 2009, Ford 2006, Flint and Fowler 1997). Because carcass persistence may differ between walkable beach and marsh or other habitats in the northern Gulf of Mexico area, determining more site-specific carcass persistence rates may help to reduce mortality estimate uncertainty.

Following Trost (2004), Objective 2 outlines studies designed to gather data on carcass detection and persistence rates to reduce uncertainty regarding mortality estimates in areas that may not be well represented by Bird Study #1. Field studies within this plan are scheduled to be performed during October and November 2011.¹ Data from these studies will supplement data produced through Objective 1 and other NRDA activities to develop overall mortality estimates in marsh and other habitats.

2.0 STUDY DESIGN

Objective 1

The study area for Objective 1 encompasses habitats where significant Response bird carcass recoveries occurred in 2010 but beached bird surveys were not conducted. Interviews with responders participating in Wildlife Operations activities helped guide the development of Standard Operating Procedures (SOPs) for determining carcass detection and persistence rates associated with Response data (included in Objective 2). This objective involves two primary components: (A) compile and review data and (B) identify and interview appropriate Response personnel (as needed).

Response data compilation and review

Given the systematic random sampling design of Bird Study #1, mortality estimates associated with the Beached Bird Model can be extrapolated to most barrier island beaches. The focus of this work plan is to derive mortality estimates for habitats, including vegetated edges (robust emergent vegetation) of bays, estuaries, and marshes accessible by motorized boat, and sandbars or other “strandland” within the estuarine environment that are not being addressed by Bird Study #1.

Because marsh habitats comprise the majority of shoreline in areas affected by the Oil Spill in southeastern Louisiana and beyond, Response search effort focused on marshes and other access-limited areas. Preliminary review of Response records indicates that detailed records from these searches are available. In order to utilize data from Response searches to estimate carcass deposition, it is necessary to estimate the area effectively sampled by observers participating in these activities. In coordination with the Trustees, the Trustee’s Principal Investigator (PI), will retrieve, compile, and evaluate Response data and trip records to associate collected carcasses with Response search effort and to identify data appropriate to use in modeling overall mortality. Response participants will also be identified and interviewed to identify sources of appropriate data and key personnel to query about search effort. Data review will include boat-based search operations. Key Response data will include shift plans, daily collection reports, daily boat

¹ The field studies described throughout this work plan occurred in the fall of 2011.

reports or float plans (and associated GPS track lines), bird recovery coordinates, etc. A review of search team track lines documentation will be conducted to identify trips that could be characterized as search effort versus rapid directional transit in response to distressed birds. Where possible and warranted, datasets maintained by State and Federal Trustees will be included in this effort, and coordination between the Trustees will occur during the compilation process to promote an efficient and comprehensive effort.

Objective 2

Researchers commonly apply one of two methods for estimating search team carcass-detection rates. They 1) conduct controlled experiments where bird carcasses are placed on transects prior to a team's search efforts and then quantify that team's success in finding carcasses (e.g., Ford and Ward 2001, Barnes and Belthoff 2008), or 2) manipulate search effort intensity on select transects with "naturally" occurring carcasses and quantify differences in carcass detection among searches conducted with different levels of effort (e.g., see Byrd et al. 2009). As with the searcher efficiency effort undertaken as part of Bird Study #1 and Bird Study #1A-LA (and detailed in supplement #1B, *Detection Probability (Searcher Efficiency)*), this work plan will use the former method ("carcass seeding").

Objective 2 is intended to be implemented in late October, 2011 and will focus on the detection and persistence of carcasses. Study personnel will include search teams responsible for carcass detection surveys and persistence teams responsible for carcass deployment prior to commencement of carcass detection surveys and routine checks of carcasses to determine longer-term carcass persistence information. This study will help refine mortality estimates based on data collected by both 1) Response crews during peak bird recoveries in summer 2010 and 2) Bird Study #10 teams (Louisiana State University personnel) in late fall 2010/ winter 2011.

Boat-based NRDA surveys were conducted along the edge of marsh habitats in Louisiana as a component of Bird Study #10. Preliminary methodologies were developed in Bird Study #11, a time-critical NRDA feasibility study (*Estimating Carcass Detection in Priority Waterfowl Habitats Impacted by the Deepwater Horizon MC252 Oil Spill*). Additional refinement of carcass detection rates in marsh habitats will address search specific conditions, e.g., search platform used during Response, representative carcass densities, visibility constraints, etc.

Except where noted below, methods for Objective 2 will follow pre-existing standard operating procedures for 1) bird preparation; 2) carcass distributions on transects; 3) carcass deployment and retrieval; and 4) data recording and chain of custody developed for Bird Study work plans #1B, #1C (*Beach Carcass Persistence Study*), #10 and #11. Methods are outlined in SOPs attached to this plan. As with previous NRDA Bird Studies, birds euthanized using chemical agents other than inhaled anesthetics will not be utilized, nor will birds associated with disease-related wildlife-mortality events.

Consistent with previous NRDA Bird Studies, bird species, weight, condition and identification number will be recorded on a 'master list' of birds used for the studies. Photographs will be taken of each placed carcass, from approximately 1, 5 and 25 meters away. Missing carcasses, if any, will be noted during subsequent monitoring of those carcasses.

As noted previously, protocols for this study will largely follow pre-existing methods used in the Beached Bird Study, Bird Study #1. A synopsis of procedures unique to Bird Study #19 follows.

Carcass Detection

- A. Transect Selection – Transects were identified in marsh edge or other “strandland” habitats representative of areas previously searched by Response personnel that were associated with routine bird recoveries. Selected marsh areas represent the dominant habitat types searched during Response operations but do not overlap with “hard” or “walkable” shorelines used for Bird Study #1. Twenty-one cells based on the 5’ GARS grid were selected that meet the following criteria: 1) they contained representative *Spartina* and *Phragmites* habitats, 2) they were the site of carcass recoveries during 2010 and 2011, and 3) they are accessible by boat and within reasonable range of field operation positions. Within the southeastern Louisiana area of interest, approximately 75-80% of marshes are *Spartina*-dominated and about 25% contain *Phragmites* dominated marsh margins (L. Handley, USGS, pers comm.). Grids were allocated in two focal areas (Barataria Bay and Pass a Loutre) with 66.7% and 33.3% of grids containing dominant *Spartina* and *Phragmites*, respectively. Within each grid, a random point was generated and the nearest accessible and contiguous marsh edge shoreline of sufficient linear extent (2 km) and of desired vegetation was identified. Transects were delineated in the north direction along the marsh edge if 2 km of habitat was available; otherwise, transects were extended in the available direction. If less than 2 km of habitat was available in the north direction, the nearest marsh edge to the random point was used as the transect midpoint for transect delineation purposes. Grids are clustered for logistic purposes in western (Barataria Bay) and eastern (Pass a Loutre) focal areas. A total of six transects were assigned (3 in each focal area) where no carcasses will be placed (Exhibit 1, Figures 1-3). Transect beginning and end points are also presented in Exhibit 1 (Table 1).

In addition to the vegetative strata (*Spartina*, *Phragmites*) that were randomly assigned to transects as described above, other “strandland” habitats representative of areas previously searched by Response personnel were identified (based on recommendations from Trustee technical representatives and logistical constraints). These sites include sandbars or other “strandland” within the estuarine environment. A minimum of two transects containing at least 2 km of desired habitat will be assessed.

- B. Size, Density, Scavenging State, Position – Each study transect will be seeded with a random number of carcasses (up to 11, with an average density of five carcasses per transect, Appendix C Table 1) based on a random Poisson distribution. Additionally, six transects containing no seeded carcasses will be searched. No information regarding number and density of carcasses will be relayed to survey crews. Carcass size, density, and position relative to vegetation edge or land/water interface were selected for this study based on interviews with Wildlife Operations Responders and NRDA study personnel, and a review of available data for dead bird recoveries in the DOI DWH

NRDA Database, and will approximate scenarios observed by Response personnel or will be consistent with carcass deposition observations on marsh edges during the drift study (Bird Study #1D). Rather than deploying birds of varied scavenging state (as was done in Bird Study #1 carcass detection efforts), intact carcasses will be deployed to enable carcass detection and persistence efforts to run concurrently. Search teams will not search any single transect on more than one occasion. Acknowledging that plumage color and other characteristics can affect bird visibility, Trustee representatives will determine bird species most appropriate for this study based on existing bird recovery records, Response personnel interviews, and carcass availability. In addition, species consistent with those recovered during Bird Study #10 will also be used when available. Specific details regarding the spacing and placement of carcasses are detailed in Appendix C. The GPS location of seeded carcasses and the vegetation obstruction conditions for that area will be recorded as carcasses are placed. All seeded birds will have a cryptic tag with a unique identification number placed on the body in a location where it would not affect visibility to search team. In addition, a small, laminated card will be attached to each carcass identifying it as part of this study.

- C. Data Collection – Where practical, personnel that performed carcass collections during Response activities will be utilized for carcass detection surveys. This will enhance consistency with search methodologies used at the height of the Response effort.

Carcass detection from boats relevant to Response efforts and Bird Study #10 may be evaluated (e.g., shallow-draft bay skiffs). A minimum of three detection teams of two individuals (plus boat driver) will be used. Each team will survey a total of three or more transects daily (dependent on logistical constraints). The Trustees will develop a schedule assigning specific transects and dates to be seeded and searched. Only the transect search schedule will be shared with the detection teams (not which transects were seeded nor with how many carcasses). Study transects will be seeded on the same day just prior to search team arrival to the extent possible. Carcass persistence teams will be responsible for carcass deployment (seeding the transects) and will avoid contact with search teams regarding study transects. Detection teams will survey transects and record carcasses observed using methods used during Response activities (Appendix D). Multiple detection teams will survey each transect on the same day that the carcasses are set out. When possible, persistence teams (e.g., “deployment” teams) will confirm the presence and condition of each seeded carcass between detection surveys. Carcasses found during surveys will be recorded. Carcasses found will not be retrieved or disturbed by detection teams. Seeded carcasses will be re-sighted by persistence teams after search teams complete study transects and all intact carcasses will be left in place for continued use in the carcass persistence study.

- D. As noted above, the detection study will run concurrently with the persistence effort, so only intact/unscavenged carcasses will be deployed for team searches on Day 1. Transects and detection teams will be divided into groups to ensure that no team searches the same transect twice. It is likely that some birds will be scavenged or otherwise removed from the transect during the detection team search period, and are not actually available to be found. In order to take this factor into account, persistence personnel will attempt to re-sight the carcasses immediately after each transect is searched. Any birds

determined to be “missing” by persistence crews will be noted. Personnel for the detection and persistence efforts will be different and will be instructed not to provide details about the known location or positions of any carcasses.

After an overnight period, if the persistence team determines sufficient birds remain on a transect and the scavenging state of the birds has been substantially altered, an additional evaluation by detection teams may be performed if practicable. These opportunistic searches may provide information about detection of birds in varied scavenging states, provided such in place scavenging readily occurs. This should result in carcasses of varied scavenging states representative of 2010 conditions.

- E. Timing – The searcher efficiency field study is scheduled to be performed in October 2011.²

Carcass Persistence

- A. Transect Selection – All transects seeded for the detection study will be used in the carcass persistence study.
- B. Size, Density, Scavenging State, Position – The carcass detection and carcass persistence studies will run concurrently to streamline costs, efficiently use field personnel, and provide realistic in-place scavenging scenarios. Accordingly, the size, density and position of seeded intact carcasses (as described for Carcass Detection, above) will be identical for the persistence effort.
- C. Data Collection – Carcasses will be checked daily by persistence teams for six days, followed by a minimum of two final observations up to 15 days after placement. If all carcasses on a transect have been designated as “missing”, that transect will not subsequently be visited. Because the detection and persistence studies will be conducted concurrently, persistence teams will check carcasses immediately following the completion of each search by detection teams to verify carcass presence, position, and condition. The return rate of Wildlife Operations teams was not necessarily fixed; however, it is likely that the total observation period proposed for the carcass persistence study spans a minimum of two searches for these crews. Likewise, marsh edge boat-based beached bird survey teams for NRDA Bird Study #10 typically checked transects every three days (dependent on weather conditions), and did not necessarily find every beached bird during a particular survey. Accordingly, the six days of daily observation encompasses two boat-based beached bird survey cycles. A minimum of two final observations up to 15 days after placement is intended to provide information about longer term persistence. The degree of scavenging and position will be noted from the boats when possible on each visit, and carcasses will be photographed at each check. As carcasses disappear during the persistence study, the daily workload for field teams will decrease, and it may be possible to consolidate or demobilize some field teams prior to 6 days to reduce costs.

² The searcher efficiency field study was completed in October of 2011.

- D. **Timing** – The persistence study will be implemented concurrent with the Phase 1 detection study. Based on the duration of the persistence work (up to 15 days), this component of the field work will extend into early November 2011. It is anticipated that all field activities will be complete prior to established migratory bird hunting seasons in the area.³

3.0 PERMITTING

All necessary permits or permissions for handling carcasses (e.g., federal Migratory Bird Treaty Act permits, State scientific collection permits) and accessing public or private lands will be obtained from the appropriate federal, state, or other entities. Field staff will carry these permits with them at all times during the study.

4.0 SAFETY

Field teams will comply with existing training and safety protocols as applicable to operations. Prior to commencement of field activities, the Trustees will agree upon a person or persons to whom study participants may report any safety concerns. Such person(s) will take action to address and resolve reported concerns. All field teams (and boat captains, where applicable) will be required to abide by the safety protocols of Incident Command, Industrial Economics, Inc., the State of Louisiana, and the Service, as applicable, that are in place at the time of the study.

5.0 COORDINATION OF FIELD WORK

Carcass Management - Carcasses encountered during field efforts that are not study carcasses will be processed according to the current Oil Spill carcass collection protocol as it may be amended (e.g., Avian Carcass Collection Protocol, Standard Operating Procedures for NRDA Bird Plan Study Field Crews, January 13, 2011, Appendix F).

6.0 DATA RECORDING AND HANDLING

Field Data Recording – Blank data sheets and directions for completing them are provided in Appendix E. These data sheets will be completed daily by each field team, and all field team members will sign the data sheet at the end of the day to certify the accuracy of the data recorded. Should discrepancies arise in the field, they should be noted and initialed by each observer prior to signature.

When photos of beached carcasses/dummies are taken, a white board (or equivalent) with the unique identification number of the carcass/dummy and the current date written on it will also be pictured in the photo.

GPS track logs will be generated and saved for any boat/ground crew efforts in which searches for carcass are conducted. Teams need not keep track logs if they are going to check carcasses that are at specific, known locations.

³ The persistence study was completed in November of 2011.

The federal Trustee representative on each field team will retain custody of all completed data sheets until they are transferred to the U.S. Fish and Wildlife Service's NRDA Office in Fairhope, Alabama, at the end of the study for archiving (and data entry into the DOI DWH NRDA database). The field team's camera memory card will remain in the custody of the federal Trustee representative on each field team until the completion of the study and will be archived at the NRDA Office in Fairhope.

Field Data Transfer - Prior to concluding each field day, teams will share all data sheets, track logs, and official photographs with each other if requested. Louisiana representatives, if present, may photograph or scan data sheets on a daily basis if desired. Field team members may also share electronic copies of all photographs taken on a daily basis, if desired and practical. On field efforts where LA representatives are present, those field representatives will be responsible for transmitting the day's data to their appropriate headquarters.

In the event that the data is collected in Louisiana without a Louisiana representative present, those data (data sheets, track logs, photos, any and all data collected as part of the field effort) will be e-mailed, within 3 days of collection, to the Louisiana Oil Spill Coordinator's Office on behalf of Louisiana. In the event that transfer of such data is delayed due to equipment malfunction or other reasons, it will be e-mailed to the Louisiana Oil Spill Coordinator's Office as soon as practicable.

Final Disposition of Original Data and Datasheets - All data (including electronically archived data), and original data sheets or electronic files, must be transferred to the U.S. Fish and Wildlife Service's Fairhope, Alabama, NRDA Office following Chain-of-Custody procedures, with copies to the Louisiana Oil Spill Coordinator's Office on behalf of Louisiana for data collected in that state on a weekly basis. Camera memory cards will be submitted to the U.S. Fish and Wildlife Service's Fairhope, Alabama, NRDA Office under Chain-of-Custody after a card is full or after the study is completed pursuant to a protocol for transferring and uploading digital photos. Prior to transfer, if a Louisiana representative is present, the Louisiana Oil Spill Coordinator's Office on behalf of Louisiana will receive copies of all camera memory cards, unless it is more practical for the FWS Fairhope Office to generate the copy.

Laboratory Results - No collection of biological or other environmental samples, nor chemical analysis of any samples, is currently included in this work plan. In the event that samples are collected during the implementation of this study, and the Trustees agree that such samples should be cooperatively submitted to a laboratory for analysis, each laboratory shall simultaneously deliver raw data, including all necessary metadata, generated as part of this work plan as a Laboratory Analytical Data Package (LADP) to the trustee Data Management Team (DMT) and the Louisiana Oil Spill Coordinator's Office (LOSCO) on behalf of the State of Louisiana. The electronic data deliverable (EDD) spreadsheet with pre-validated analytical results, which is a component of the complete LADP, will also be delivered to the secure FTP drop box maintained by the Trustees' Data Management Team (DMT). Any preliminary data distributed to the DMT shall also be distributed to LOSCO. Thereafter, the DMT will validate and perform quality assurance/quality control (QA/QC) procedures on the LADP consistent with the authorized Analytical Quality Assurance Plan, after which time the validated/QA/QC'd data

shall be made available simultaneously to all trustees. Any questions raised on the validated/QA/QC results shall be handled per the procedures in the Analytical Quality Assurance Plan and the issue and results shall be distributed to all parties. In the interest of maintaining one consistent data set for use by all parties, only the validated/QA/QC'd data set released by the DMT shall be considered the consensus data set. In order to ensure reliability of the consensus data and full review by the parties, no party shall publish consensus data until 7 days after such data has been made available to the parties. Also, the LADP shall not be released prior to validation/QA/QC absent a showing of critical operational need. Should any party show a critical operational need for data prior to validation/QA/QC, any released data will be clearly marked "preliminary/unvalidated" and will be made available equally to all Trustees.

7.0 STANDARD OPERATING PROCEDURES

Various SOPs are appended to this work plan. After field studies are completed, all recovered carcasses will be retained and disposed of in accordance with Pretrial Orders regarding preservation of samples.

8.0 REFERENCES

- Barnes, K. P., and J. R. Belthoff. 2008. Probability of detection of flammulated owls using nocturnal broadcast surveys. *Journal of Field Ornithology* 79:321-328.
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Trost, R.E. 2004. Tundra Swan (*Cygnus columbianus*) injury assessment, Lower Coeur d'Alene River Basin. Expert Report for the U.S. Fish and Wildlife Service.

9.0 BUDGET

The parties acknowledge that these budgets are estimates, and that actual costs may vary.

Expense Summary (detailed budget follows):

Objective 1	\$136,181.04
Objective 2	\$239,912.45
Grand Total	\$376,093.49

LIST OF APPENDICES

Appendix A – Fairhope, AL NRDA Field Office Carcass Inventory

Appendix B: Bird Preparation SOP for Detection and Persistence

Appendix C: Carcass Numbers, Size, Position and Distance from Start of Transect SOP for Detection and Persistence

Appendix D: SOP for Deployment & Observation of Carcasses for Detection and Persistence

Appendix E: Data Collection SOP for Detection and Persistence

Appendix F: Carcass Collection Protocol

LIST OF EXHIBITS

Exhibit 1: Searcher Efficiency and Persistence Transect Locations

Exhibit 2: Searcher Efficiency Data Sheet

Exhibit 3: Carcass Persistence Data Sheet

Exhibit 4: Chain of Custody Forms

WORK PLAN FOR ASSESSING BIRD MORTALITY USING DATA FROM RESPONSE OPERATIONS AND BOAT-BASED NRDA SURVEYS IN THE NORTHERN GULF OF MEXICO NEAR THE MISSISSIPPI CANYON 252 OIL SPILL

(Bird Study #19)

Approval of this work plan is for the purpose of obtaining data for the Natural Resources Damage Assessment. Each party signing below reserves its right to produce its own independent interpretation and analysis of any data collected pursuant to this work plan

APPROVAL

Kevin D. Reynolds
DOI Deepwater Horizon Case Manager

6/26/2012
Date


State of Louisiana Trustee Representative

7/13/2012
Date

Appendix A – Fairhope, AL NRDA Field Office Carcass Inventory (as of 17 October 2011)

Daphne Freezer Bird Count

(birds are whole/unscavenged)

Species	Count
Barred Owl	2
Brown Pelican	2
Gadwell	3
Greater Scaup	1
Herring gull	41
Laughing gull	42
Lesser Scaup	2
Mallard	5
Pintail Duck	1
Red-shouldered hawk	1
Ringbilled Gull	4
Scaup	4
Wood duck	1
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Appendix B: Bird Preparation SOP for Detection and Persistence

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 in Appendix A. Carcasses will be thawed at least 24 hrs before deployment.
2. For searcher efficiency evaluation and carcass persistence purposes, a review of available data for dead bird recoveries in the DOI DWH NRDA Database was conducted. Birds were 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 bird recovery data as of October 14, 2011), and many laughing gull carcasses are available in the Daphne freezer. 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' category⁶, and birds larger than 500g are assigned to 'large' (up to 1kg) and 'extra large' (more than 1kg) categories. Carcass availability will largely determine the size class of birds used in the study. Birds recovered by Wildlife Ops and Law Enforcement personnel were most frequently in the 'medium' size class (due in part to the large number of laughing gulls recovered). The 'medium' size class is also dominantly represented in birds available for this study.
3. In addition to size, other characteristics (e.g., plumage) can affect bird suitability for this study. Trustee representatives will determine if specific birds in the Daphne freezer are inappropriate for use, due to coloring or other issues. Because wildlife operations and Response search teams relied on visual spotting of carcasses, the determination is whether birds are likely to be substantially more visible than beached birds. If not, they should be considered suitable for use.
4. As the available supply of carcasses allows, preference will be given to using species that are present locally. Other bird species may be used if necessary. Trustee representatives will determine if there are any compelling reasons why specific birds in the Daphne freezer are inappropriate for use in the concurrent detection and carcass persistence evaluations. No birds euthanized using chemical agents other than inhalant anesthetics, killed with lead shot, or birds from disease-related wildlife mortality events will be used.
5. Because the carcass detection and persistence surveys will be implemented concurrently, carcasses used for this study will be intact and unscavenged. It is anticipated that some scavenging of carcasses will occur when placed in the field resulting in both scavenged and no/lightly scavenged carcasses to be available for visual observation by searcher efficiency teams.
6. All birds will have a cryptic tag with a unique identification number in a location unlikely to affect visibility to detection teams (patagium and upper leg). Bird species, weight, and identification number will be recorded on a 'master list' of birds used for the detection and carcass persistence studies.

⁶ Due to a shortage of small carcasses, small laughing gulls (weighing ~200g) may be substituted for small carcasses if carcasses weighing less than 200g are not available.

7. 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, PLEASE DO NOT remove bird. If questions, please CALL 765-749-4768.

8. All birds will be sorted prior to beginning of the deployments and processed as previously identified. Individual birds will be bagged, with the transect number and carcass/placement details (i.e. size category, distance from start of start of transect and position relative to marsh edge or surf for sandbar/spits) 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 indicated on the bag. Bird carcasses held in the larger transect bag/container will be thawed at least 24 hours prior to deployment.

Appendix C: Carcass Numbers, Size, Position and Distance from Start of Transect SOP for Detection and Persistence

1. Table 1 at the end of this SOP identifies carcass numbers, position, and distance from the transect start for each transect used for searcher efficiency study purposes.
2. Carcass placements were determined using a randomization process, using distributions informed based on Wildlife Operations staff interviews and from data available as of October 14, 2011, for marsh edge NRDA searches (Bird Study #10) modified as described below:
 - a. Number of carcasses found per transect search: An average density of 5 carcasses per 2 km transect. Accordingly, each transect was assigned between 2 and 11 carcasses. This seeding density is slightly higher than evident based on Wildlife Operations personnel interviews and Bird Study #10 results, but is needed to address the likelihood that some birds were deposited on marsh edges and interior edge marsh but not found by wildlife operations or Bird Study #10 teams.⁷

On the sandbar/spit transects, an average density of 4.5 carcasses per 2 km transect was used. Between three and six carcasses were assigned.
 - b. Carcass size: The size class distribution of available carcasses for the study will be used to randomly assign carcasses to each transect (e.g., 4.5% ‘extra large’, 19.2% ‘large’, 76.1% ‘medium’).
3. Scavenging condition: Rather than deploying birds of varied scavenging state (as was done in Bird Study #1 carcass detection efforts), intact carcasses will be deployed to enable carcass detection and persistence efforts to run concurrently. Since scavenging will probably occur in place during the detection effort, scavenging condition will be noted each time carcasses are detected in the searcher efficiency effort or re-sighted in the persistence effort. Since only intact birds will be used in the seeding process the ‘mummified/skeletal’ condition category is excluded.
4. Position: Each transect was assigned between 2 and 11 carcasses at random distances along the transect from the start point. The position relative to vegetation edge or land/water interface was selected for this study based on scenarios observed by Response personnel. It is also consistent with beached carcass positioning on marsh edges observed during the drift study (Bird Study #1D). Interviews with Wildlife Operations personnel and NRDA teams searching marshes (Bird Study #10) indicate that the visual obstruction of marsh vegetation limits searcher efficiency at distances interior to the marsh edge of 5 meters or less (interior edge) dependent on vegetation density.

Fifty percent of carcasses will be placed (consistent with the manner in which carcasses drifting into the marsh edge “lodge” in the vegetation) on the marsh margin with zero

⁷ The average density of 5 carcasses per transect applies across all 21 transects utilized in this study. Due to logistical constraints presented in the field, some transect-specific numbers presented in Table 1 may change; therefore, these values should be considered preliminary and will be proofed against field data sheets when that information becomes available.

penetration into the marsh edge. The remaining 50% of carcasses will be positioned at a randomly assigned distances into the marsh vegetation (perpendicular from the marsh vegetation margin) up to 5 meters interior to the marsh margin. To the extent possible, deployment methods will minimize any signs of human activity such as disruption of the vegetation or tracks. Carcasses will be placed using a long reach pole with grapple to minimize the potential for marsh vegetation disruption during seeding to introduce a visual cue for detection teams. Vegetation density will be measured at the time of carcass placement and recovery.

Limited wildlife operation searches occurred in the interior portions of the marshes (e.g., greater than 5 meters from a navigable margin) and those episodic searches such as post-nesting colony sweeps are not the focus of this searcher efficiency study. Because searcher efficiency may be lower in the 5 meters interior to the marsh edge relative to the marsh margin, carcass positions were randomly assigned to each transect using a distribution of 50% on the marsh margin and 50% within the interior marsh edge.

On the sandbar/spit transects, carcass positioning will encompass the three zones evaluated in Bird Study #1B: upper intertidal, wrack, and lower intertidal.

- Distance from start of transect: Distances were randomly assigned using a uniform random distribution, based on the assumption of transects 2 km in length.

Table 1. Carcass placement descriptions for each transect.

Transect ID	GARS Cell ID	Random Longitude	Random Latitude	Bird ID	Distance from Origin	Distance from Margin	Number of Carcasses
1	180KY25	90.08521	29.3352	2	1123	0.0	5
1	180KY25	90.08521	29.3352	3	1361	0.5	
1	180KY25	90.08521	29.3352	4	1697	1.5	
1	180KY25	90.08521	29.3352	1	322	3.3	
1	180KY25	90.08521	29.3352	5	1936	3.7	
2	180KY23	90.02483	29.4415	1	22	0.3	3
2	180KY23	90.02483	29.4415	3	295	1.3	
2	180KY23	90.02483	29.4415	2	156	1.7	
3	180KY26	90.0769	29.41023	1	26	0.0	2
3	180KY26	90.0769	29.41023	2	766	3.3	
4	180KY29	90.04004	29.29004	2	401	0.0	11
4	180KY29	90.04004	29.29004	5	897	0.0	
4	180KY29	90.04004	29.29004	8	1397	0.0	
4	180KY29	90.04004	29.29004	9	1504	0.0	
4	180KY29	90.04004	29.29004	11	1928	0.0	
4	180KY29	90.04004	29.29004	6	962	0.2	

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4	180KY29	90.04004	29.29004	4	703	1.3	
4	180KY29	90.04004	29.29004	10	1677	2.8	
4	180KY29	90.04004	29.29004	7	1037	3.2	
4	180KY29	90.04004	29.29004	3	664	4.5	
4	180KY29	90.04004	29.29004	1	271	4.8	
5	181KY11	89.94748	29.44748	1	415	0.0	7
5	181KY11	89.94748	29.44748	2	449	0.0	
5	181KY11	89.94748	29.44748	5	1165	0.0	
5	181KY11	89.94748	29.44748	6	1805	0.0	
5	181KY11	89.94748	29.44748	7	1910	0.0	
5	181KY11	89.94748	29.44748	3	709	1.8	
5	181KY11	89.94748	29.44748	4	997	4.7	
6	181KY14	89.9496	29.36627	4	369	0.0	8
6	181KY14	89.9496	29.36627	5	478	0.0	
6	181KY14	89.9496	29.36627	7	1061	0.0	
6	181KY14	89.9496	29.36627	1	23	0.2	
6	181KY14	89.9496	29.36627	3	253	3.5	
6	181KY14	89.9496	29.36627	8	1794	3.5	
6	181KY14	89.9496	29.36627	2	211	3.7	
6	181KY14	89.9496	29.36627	6	779	3.8	
7	181KY17	89.99056	29.32389	1	31	0.0	7
7	181KY17	89.99056	29.32389	5	1499	0.0	
7	181KY17	89.99056	29.32389	7	1917	1.2	
7	181KY17	89.99056	29.32389	4	1260	1.5	
7	181KY17	89.99056	29.32389	2	295	2.2	
7	181KY17	89.99056	29.32389	3	779	3.5	
7	181KY17	89.99056	29.32389	6	1713	3.8	
8	181KY12	89.91179	29.49513	1	149	0.0	5
8	181KY12	89.91179	29.49513	4	1446	0.0	
8	181KY12	89.91179	29.49513	5	1711	0.0	
8	181KY12	89.91179	29.49513	2	1357	0.2	
8	181KY12	89.91179	29.49513	3	1365	0.7	
9	181KY15	89.89494	29.39493	4	1770	0.0	4
9	181KY15	89.89494	29.39493	2	1033	1.5	
9	181KY15	89.89494	29.39493	1	263	2.2	
9	181KY15	89.89494	29.39493	3	1435	2.2	
10	181KY18	89.87061	29.28727	2	522	0.0	5
10	181KY18	89.87061	29.28727	3	935	0.0	
10	181KY18	89.87061	29.28727	4	1069	0.0	
10	181KY18	89.87061	29.28727	5	1139	0.0	
10	181KY18	89.87061	29.28727	1	393	0.8	

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11	181KY13	89.78613	29.45279	3	1518	0.0	6
11	181KY13	89.78613	29.45279	4	1793	0.0	
11	181KY13	89.78613	29.45279	6	1891	0.0	
11	181KY13	89.78613	29.45279	1	58	0.3	
11	181KY13	89.78613	29.45279	5	1815	2.7	
11	181KY13	89.78613	29.45279	2	810	4.2	
12	181KY16	89.81252	29.39586	1	149	0.0	6
12	181KY16	89.81252	29.39586	3	372	0.0	
12	181KY16	89.81252	29.39586	4	524	0.0	
12	181KY16	89.81252	29.39586	6	1819	0.0	
12	181KY16	89.81252	29.39586	2	193	2.7	
12	181KY16	89.81252	29.39586	5	671	3.3	
13	181KY19	89.75668	29.25667	3	997	0.0	3
13	181KY19	89.75668	29.25667	1	354	3.5	
13	181KY19	89.75668	29.25667	2	382	4.8	
14	181KY24	89.73161	29.39828	2	1961	2.0	2
14	181KY24	89.73161	29.39828	1	771	5.0	
15	182KY38	89.36394	29.03061	1	479	0.0	3
15	182KY38	89.36394	29.03061	2	843	0.0	
15	182KY38	89.36394	29.03061	3	1028	3.8	
16	182KX12	89.40862	28.99195	2	303	0.0	6
16	182KX12	89.40862	28.99195	3	615	0.0	
16	182KX12	89.40862	28.99195	4	722	0.0	
16	182KX12	89.40862	28.99195	6	1336	2.3	
16	182KX12	89.40862	28.99195	5	811	2.5	
16	182KX12	89.40862	28.99195	1	226	3.0	
17	182KY36	89.32067	29.15401	3	731	0.0	5
17	182KY36	89.32067	29.15401	4	1664	0.0	
17	182KY36	89.32067	29.15401	5	1882	0.0	
17	182KY36	89.32067	29.15401	2	371	0.5	
17	182KY36	89.32067	29.15401	1	109	0.8	
18	182KY39	89.25504	29.00504	2	282	0.0	3
18	182KY39	89.25504	29.00504	3	1651	0.0	
18	182KY39	89.25504	29.00504	1	69	1.2	
19	182KY47	89.19535	29.02869	2	437	0.0	8
19	182KY47	89.19535	29.02869	3	447	0.0	
19	182KY47	89.19535	29.02869	5	833	0.0	
19	182KY47	89.19535	29.02869	1	201	0.5	
19	182KY47	89.19535	29.02869	6	1002	1.7	
19	182KY47	89.19535	29.02869	7	1084	2.7	
19	182KY47	89.19535	29.02869	8	1143	2.7	

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19	182KY47	89.19535	29.02869	4	659	4.7	
20	182KY48	89.11261	29.02927	4	1652	0.0	5
20	182KY48	89.11261	29.02927	5	1997	0.0	
20	182KY48	89.11261	29.02927	3	1071	1.5	
20	182KY48	89.11261	29.02927	1	124	3.0	
20	182KY48	89.11261	29.02927	2	454	4.3	
21	182KX22	89.15512	28.98846	2	1575	0.0	2
21	182KX22	89.15512	28.98846	1	62	1.0	
Scofield Bay: Spit 1	n/a	TBD ⁸	TBD	1	102	Lower	6
	n/a	TBD	TBD	2	295	Upper	
	n/a	TBD	TBD	3	461	Upper	
	n/a	TBD	TBD	4	596	Lower	
	n/a	TBD	TBD	5	1063	Upper	
	n/a	TBD	TBD	6	1572	Wrack	
SE Pass: Spit 2	n/a	TBD	TBD	1	141	Wrack	3
	n/a	TBD	TBD	2	1136	Upper	
	n/a	TBD	TBD	3	1584	Upper	

⁸ To be determined based on field reconnaissance

Appendix D: SOP for Deployment & Observation of Carcasses for Detection and Persistence

Use of two person teams is planned and is preferable for safety and other reasons. Because of the limited time available for the carcass detection and persistence studies (e.g., migratory hunting seasons begin in the study area in mid-November), one person teams (plus boat driver) can be utilized to deploy and retrieve carcasses, if such activities can be accomplished in a safe manner and is agreed to by representatives and the individual who would be working alone. All detection teams will be comprised of a minimum of two individuals.

1. Ideally, persistence teams will deploy carcasses just before detection teams are scheduled to search that transect. Tidal timing should be considered (see below) to the extent feasible. Trustee representatives will discuss and agree to the following day's deployment schedule.
2. Transects will require boat access. Detection teams will need to coordinate in advance with carcass detection and persistence project team personnel to determine logistics.
3. Persistence teams responsible for carcass deployment 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, and placement location information is consistent with those specified in the SOP for carcass placement.
4. Persistence teams responsible for carcass deployment 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 'search zone' (see below). For example, as described in Appendix C, a long reach grapple pole will be used for carcass placement in the interior marsh edge zone.
5. Persistence teams responsible for carcass deployment will place carcasses at 'marsh margin' and 'interior marsh edge' zones on the marsh transects and in 'wrack', 'upper' and 'lower' positions on the sandbar/spit transects. The overall intent is to place birds in a natural, realistic manner. Review of photographs of carcasses found by Bird Study #10 teams (when available), Wildlife Ops/Bird Study #10 search team managers interviews, and/or preliminary results regarding beaching scenarios observed during Bird Study #1D will guide placement. The following procedures should be modified as warranted:
 - a. Placement on Marsh Edge Transects: 'Marsh margin' carcasses can be allowed to naturally drift into the margin if conditions allow (or can be manually placed to mimic appearance when naturally lodged). 'Interior marsh edge' carcasses will be manually placed using a long-reach grapple pole and should be positioned such that the carcass is neither "propped up" nor obscured by dense vegetation.

The 'interior marsh edge' zone is defined as the first 5 meters perpendicular to the marsh edge inward from the marsh edge. In some marsh edge areas, continuous marsh substrate may not be present 5 meters inward from the marsh edge (e.g., ponds or narrow strips of marsh habitat). If very little marsh substrate exists at

the specified interior distance from the marsh edge, persistence teams should place the carcass at the nearest area perpendicular to the marsh edge with targeted habitat and substrate conditions. Any changes in carcass placement from the original specification (e.g., moved to a different distance from the marsh edge due to lack of available substrate/habitat) should be clearly noted on the data sheet.

- b. Placement on Sandbar/Spit Transects: The 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 sandbars, 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. Carcasses should be simply placed on the substrate. Birds specified for ‘wrack’ placement should be placed on substrate next to wrack debris, neither “propped up” nor buried by the wrack.

If no wrack or very little wrack is present at the specified distance from the transect start, persistence teams should place the carcass along the line separating the upper and lower beach (e.g., the current high tide line).

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.

- c. 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 detection team searches. Marsh margin and lower intertidal sandbar/spit placements are at greatest risk of rewash. If, given the timing of tides and detection team surveys, Trustee representatives agree that placement on the marsh margin (Marsh Edge Transect) or lower intertidal placement (Sandbar/Spit Transect) would likely be rewash, an ‘interior marsh edge’ or ‘high intertidal’ placement will be substituted, respectively. As feasible, a reverse substitution will be made on one of the next day’s transects (i.e., higher intertidal changed to lower intertidal).

6. The latitude and longitude of placed carcasses should be noted on data sheets provided to the persistence teams responsible for carcass deployment, along with carcass identification number, size class, estimated distance from start of transect, time of placement, and position relative to marsh edge or surf.
7. Three photographs should be taken of each placed carcass, from approximately 1, 5 and 25 meters away. No zoom should be used. The purpose of the 1m photograph is to document the carcass state. The purpose of the 5m photograph is to provide a reference photograph to which to compare subsequent 5m photographs depicting movement of the carcass on the beach. The purpose of the 25m photograph is to document the environment surrounding the carcass.

8. After persistence teams have completed the carcass placement, the detection team will search the transect as soon as possible. Detection teams will be kept away from the area during the deployment, and efforts will be made to ensure that detection teams are unaware of which transects have been seeded. Detection teams will follow general methods utilized in both the Response efforts and during marsh edge beached bird searches for Bird Study #10. Shallow draft vessels will be utilized and will travel at the minimum safe speed to maintain steerage. Boat speed should be maintained at sufficiently low throttle to avoid generating wake (generally less than 5 mph). Shallow draft vessels should maintain the closest safe distance to the marsh edge allowable by the vessel draft and outboard motor depth (consistent with typical Response search methods). Teams of two searchers (plus boat driver) will be utilized. Teams will use a combination of binoculars and naked eye consistent with the approach used to search the vegetation during the original spill response. Detection teams will conduct searches from within the boat and will not search for birds by leaving the boat and wading/walking into marsh areas.
9. When detection teams observe carcasses, under no circumstances should detection teams attempt to retrieve the bird. Rather, records should be recorded on the Searcher Efficiency Data sheet (Exhibit #2) and photos should be taken (at 1 and 5 m) when possible. All GPS coordinates for bird locations and photos should be taken at the closest distance to the bird and marsh edge as possible without disturbing the bird or the marsh vegetation.
10. Persistence teams should return to transects as soon as feasible after the detection search team has completed its survey to re-sight carcasses. Efforts must be made to re-sight every carcass. When attempting to re-sight carcasses, persistence teams should limit their search to a few meters deep into marsh edge (beyond the original placement location), and a maximum distance of 300 meters to either side of the last observed location (re-sighting effort for each carcass should be less than ½ hour). The outcome (re-sighted or not re-sighted) must be noted on appropriate searcher efficiency and persistence data sheets. Persistence teams should make every effort to minimize vegetation disturbance and leave no vegetation disturbance tracks.
11. A total of three separate detection teams will be used, and all three teams will search each transect. Accordingly, the protocol outlined in #8 and #10 above will be repeated three distinct times with a persistence team searching the transect following each detection team search as feasible to assure the presence and condition of carcasses.
12. After the initial rounds of concurrent carcass detection and persistence team searches as described above, persistence team will return to the transect on Day 2 and re-sight the deployed carcasses. If the persistence team determines sufficient birds remain on a transect and the scavenging state of the birds has been substantially altered, an additional evaluation by detection teams may be performed if feasible.
13. After the carcass detection component of the study is complete, persistence study teams should return to each transect and record whether or not carcasses are present, and if so, their location and condition. If the carcass is present, one photograph will be taken from approximately 1 meter away (intended to document carcass condition) and from 5 meters away (to photo-document any movement of the carcass from its original location). If a carcass is found to have moved more than 25 meters away from its location at last check,

carcasses should be photographed from 1, 5, and 25 meters away. (Photographs from 25m are not needed if the carcass has not significantly moved, since the purpose of the 25m photo is to illustrate the environment surrounding the carcass, which will not have changed.)

14. If a carcass is not present, one photograph will be taken from one meter away from where the carcass should have been found in order to document any animal or human tracks or other evidence that might be associated with the carcass' disappearance.
15. If a subsequent carcass check determines that a carcass is missing from its last known location, teams should search the transect in case the carcass has rewashd or otherwise been moved up or down the beach. For Marsh Edge transects, searches should be limited to a few meters deep into marsh edge (beyond the original placement location), and a maximum of 300 meters to either side of the last observed location per above. For sandbar/spit transects, teams should search the entire transect in case the carcass has rewashd or otherwise been moved up or down the beach. The area of the beach to be searched for "missing" carcass should be the same as was searched during the Bird Study #1C (i.e., between the water's edge and 5 m landward of the old wrack line).

At a minimum, "missing carcass" searches should cover the portion of the transect between the carcasses located closest and farthest from the transect start on the prior day, plus 300 meters on either end. The field team will take a photograph (from 1 and 5 meters away) of the location where the carcass should have been found. If a "missing" carcass is found, its new location should be noted on the study data sheet and photographs taken from 1, 5, and 25 meters away. If not found, the carcass should be noted as "Missing" on the study data sheet, and "N/A" should be written on the data sheet for the GPS location and position relative to surf. Carcasses found to be moved from their original locations *should not* be repositioned back at the original placement area.

16. Definitions of carcass state are provided below:

- a. **No scavenging**

- i. "Int." – intact carcass and there is no evidence of scavenging

- b. **Lightly scavenged**

- i. "Dist." - carcass is disturbed. Although skin is broken, carcass is mostly intact
 - ii. "PR" - pectorals removed but organs present, or
 - iii. "OR" - organs removed but pectorals present

- c. **Heavily scavenged**

- i. "SB" - skin and bones only; pectorals and organs removed
 - ii. "PG" - fragmentary; pelvic girdle only
 - iii. "Wing" - fragmentary; one or both wings only, or
 - iv. "Skin" – a few feathers attached to skin fragments

- d. **Removed**

- i. “Miss.” – carcass is missing, and no part of carcass remains
17. For each carcass observed during carcass checks, study team members should provide notes explaining the basis for choosing the carcass state selected, if one carcass state code does not adequately describe the condition and to ensure consistency in coding scavenging condition among persistence teams.
 18. Carcass checks at a particular transect will continue on a daily basis for six days, followed by a minimum of two final observations up to 15 days after placement. If all carcasses on a transect have been designated as missing, that transect will not subsequently be visited. For safety reasons, continued carcass checks will be discontinued regardless of study duration when the migratory hunting season commences. Photographs will be taken from 1 and 5 meters away on the final check day unless the carcass has moved more than 25m away from the original placement location (then see item #13 above).

If any carcasses are present on the day of the last check, they will be collected. All recovered carcasses will be retained and disposed of in accordance with Pretrial Orders regarding preservation of evidence.

Appendix E: Data Collection SOP for Detection and Persistence

1. A copy of the data sheet to be used for the searcher efficiency study is included as Exhibit 2 to this work plan. A copy of the data sheet to be used for the persistence study is included as Exhibit 3 to this work plan. One data sheet will be completed for each transect included in the searcher efficiency effort. The general purpose of the searcher efficiency data sheet is to document information about carcasses placed by the persistence teams that were subsequently “found” by detection teams. One data sheet will be completed by each detection team each day for every transect included in the study. The general purpose of the carcass persistence data sheet is to document carcass placement location and record carcass status on each field day. All data forms will be filled out on paper, in ink.
2. At the end of each day, each data sheet will be signed by Trustee representatives on each searcher efficiency or persistence team. Original data sheets will remain in the possession of the Department of Interior Trustee representative on each team until the team has completed their assigned transects. If present, the LA representative will be provided the opportunity to copy each data sheet after completion of transect observations each day. At the end of the study, the original data sheets will be provided to a designated Department of Interior representative. The DOI representative will scan all data sheets onto CDs; one set of CDs will be mailed to a designated LOSCO representative and one set to IEC under proper Chain of Custody procedures.
3. At the end of each day detection and persistence team photographs of each bird (as specified in the SOPs) will be downloaded to a computer, and given a name using the following conventions:
 - a. Detection Team photos: the first symbols will be the letters “BS19SEStudy” followed by an underscore; the next symbols will be the Transect number followed by an underscore; the next symbols will be the team identifier number; the next symbol will be the number given to each carcass found (in sequential order, for example if three birds are found on a transect, birds will simply be numbered one through three) followed by an underscore; the next symbols will be the date of sighting using ‘mm-dd-yy’ format followed by an underscore; and the last symbols will be ‘1’, or ‘5’ for the photos taken approximately 1, and 5 meters from the carcass, respectively.
 - b. Persistence Team photos: the first symbols will be the letters “BS19CPStudy” followed by an underscore; the next symbols will be the Transect number 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 ‘1’, ‘5’ or ‘25’ for the photos taken approximately 1, 5 and 25 meters from the carcass, respectively. For a carcass that was “missing” from its placement location but was found later the same day, the field team will have two sets of photographs for the same carcass (see below). In this event, add to the end of the naming convention described above an underscore and ‘missing’ (to identify the photos of the location the carcass should have been in) or ‘found’

(to identify the photos of the ‘found’ carcass). At the end of the study, the Trustee representative will load electronic copies of all photos to one or more CDs (or other electronic storage media); one set of photos will be mailed to a designated LOSCO representative under proper Chain of Custody procedures, and one set will be provided to IEC.

4. Original data sheets from previous field days must not be carried in the field, in order to protect data sheets from inadvertent damage. Therefore, each field persistence team must compile before each field event all the information they will need to be able to efficiently revisit the locations of each carcass observed on the previous day. The study data sheet contains a column for listing the previous day’s GPS coordinates for each carcass. If additional information is needed, it is recommended that such information is carried in field notebooks.
5. Surveyors should start the study using new/blank camera memory cards. Do not delete any photos from the memory cards. At the end of the study, the memory cards will be provided to a designated Department of Interior Trustee representative, using appropriate Chain of Custody procedures, for archiving.
6. Filling out the Searcher Efficiency Study data sheets:
 - a. A copy of the data sheets to be used for the searcher efficiency study is included as Exhibit 2. One data sheet will be completed for each detection team for each transect type (marsh edge, sandbar/spit) included in the searcher efficiency study, and will be filled out on paper, in ink.
 - b. All blanks in the data sheet should contain either data or an “X” (that would indicate that such blank was purposefully not filled in). Any data entry errors should be crossed out with a single thin line and initialed.
 - c. The start and end time of the survey should be recorded along with corresponding GPS coordinates of the start and end points of the transect surveyed.
 - d. Detection teams should not attempt to retrieve or handle carcasses found. While each carcass will be tagged with unique ID numbers, it is probable that detection teams will not be able to read them, so detection teams should fill out the “Carcass ID” field as follows: BS19SE_transectID#_teamID_Bird#, where the first symbols will be the letters “BS19SEStudy” followed by an underscore; the next symbols will be the Transect number followed by an underscore; the next symbols will be the team identifier number; the next symbol will be the number given to each carcass found (in sequential order, for example if three birds are found on a transect, birds will simply be numbered one through three).
 - e. The “Distance from Edge” field (marsh edge transects only) should be recorded as the estimated perpendicular distance from the marsh margin. Actual measurements should not be made in order to minimize disturbance to the marsh edge habitat.

- f. The “Position relative to surf” field (sandbar/spit transects only) should be recorded as one of the following categories: low (wash zone), upper (high tide), or wrack.
 - g. After a datasheet is completed, the survey team members will sign the datasheet, indicating that they all agree that the data contained therein is correct.
7. Filling out the Carcass Persistence Study data sheet:
- b. All blanks in the data sheet should contain either data or an “X” (that would indicate that such blank was purposefully not filled in). Any data entry errors should be crossed out with a single thin line and initialed.
 - h. After a datasheet is completed, the survey team members will sign the datasheet, indicating that they all agree that the data contained therein is correct.
 - i. Record the latitude and longitude for the carcass on placement day and on each day the carcass is visited. The data sheet contains columns titled “GPS Location Previous Day” and “GPS Location Today.” On carcass placement day, only the “GPS Location Today” column will be used. On carcass check days, “GPS Location Today” is used to record the location of the carcass that day, while “GPS Location Previous Day” is used to record the location of the carcass on the previous day to assist the field team in relocating the carcass that day.
 - j. The column “Distance from transect start” is primarily to be used on the placement day, and the pre-assigned distance should be written in. This data can assist the surveyors in locating carcasses on revisit days, but there is no need to re-measure this distance on revisit days. If this column is not used on revisit days, cross out the column with a large “X”.
 - k. For the columns “position relative to marsh edge” and “carcass state” choose only one value from the pick list. On carcass check days, these columns are to be used to describe the carcass that day.
 - l. In the “Notes” column, record any potentially useful information not covered by the “carcass state” codes. For instance, record descriptions of carcass movement and any evidence for the cause of a carcass’ movement or removal (e.g., footprints/tracks present, sightings of scavengers at the carcass, likely re-wash, etc.).
 - m. If a search was conducted for a suspected “missing” carcass and the “missing” carcass was subsequently found, take photographs from 1 and 5 meters away at the original location and from 1, 5, and 25 meters away at the new location. Use a new row in the datasheet to record the new location data.
 - n. If a carcass is determined to be “missing,” enter “N/A” in the cells for GPS Location and Position Relative to Marsh Edge.
 - o. If a second / continuation data sheet is needed for a transect survey, use another data sheet. Make sure that the header information is consistent between the first page and

subsequent pages. Label the top of subsequent pages with the appropriate page number.

8. Filling out the Chain of Custody form

- a. When transferring custody of original data sheets or camera memory cards, such transfer must be documented using a Chain of Custody form (Exhibit 4).
 - i. Leave “Date and Time of Seizure” and “File No.” blank.
 - ii. In “Evidence/Property Seized By” fill in the name of the person who has had custody of the item for the duration of the study. If not the Carcass Persistence Team Leader, then strike that label out on the form.
 - iii. Fill in information in “Description of Evidence/Property.” All items listed can be grouped as “Item No. 001”
 - iv. Enter the appropriate item number in the first column.
 - v. The person releasing the evidence/property signs the “From” row, and the person receiving the evidence/property signs the “To” row.
9. All persons signing the Chain of Custody form should keep a photocopy for his/her records. However, the original signature sheet remains with the evidence/property. Copies of the original signature sheet will be furnished to LOSCO at completion of the study, as such copies are part of the data transfer packages described above for transferring copies of data sheets and photographs.

Appendix F: Carcass Collection Protocol

AVIAN CARCASS COLLECTION PROTOCOL Standard Operating Procedures for NRDA Bird Plan Study Field Crews January 13, 2011

The purpose of this protocol is to describe when and how to collect bird carcasses, as part of US Fish and Wildlife Service NRDA field studies being conducted to assess potential injury to birds during the MS Canyon 252 Deepwater Horizon Oil Spill. This protocol is periodically updated, according to current NRDA needs and injury conditions.

BEACHED BIRD SEARCH TEAMS (or members of NRDA Bird Study Surveys assigned this task):

- Teams will consist of at least two members. At least one member of the team should have previous carcass search and collection experience or have completed standardized training based on this protocol.
- Each collection team will be issued a carcass collection kit. Each kit should contain a carcass collection form.
- Begin each collection by filling out the top portion of the form for each location; carcass specific information is entered in the lower portion under the “DEAD BIRDS COLLECTED” heading.

WHEN TO COLLECT CARCASSES

The attached “Carcass Collection at a Glance” table illustrates final disposition of the carcass, based on characteristics of the carcass. The table also defines when a carcass should be collected or left in place.

If the carcass is banded, tagged or transmitted it could be a NRDA study bird. These carcasses will be collected regardless of their status. Record how bird is marked (band, tag or transmitter) and all associated numbers on its unique blue Evidence Identification Tag (see below).

If the carcass is of a species listed on the federal Endangered Species List, treat the carcass as if it were banded, tagged, or transmitted.

Carcass Collection Protocol

- Wear nitrile gloves when handling bird carcasses. A new pair of gloves should be donned prior to handling each bird.

- If one or more bird carcasses are found and collected at any one location, assign a **white Evidence Seizure Tag** (Form 3-487) for that location. Each Seizure Tag is imprinted with a unique number. Fill out the entire datasheet **except for the INV number block** (the Evidence Custodian will fill this in at the Intake Center). Do not leave anything blank other than the INV.
- Complete a **blue Evidence Identification Tag** (Form 3-2052) for each carcass that is collected. One blue Identification Tag is used to identify each individual carcass and should be filled in to include: the white Seizure Tag Number – collection number; date; and initials of the collector. Collectors should **not fill in the file no.** on the Identification tag (the Evidence Custodian will fill this at Intake Center).

NOTE: If more than one carcass is collected from a single location, then multiple blue Identification Tags will be recorded on the single white Seizure Tag assigned to that location. However, do not exceed 10 carcasses per seizure tag; use additional tags if necessary. If only a single carcass is collected, its blue Evidence Tag will be the only one recorded on the white Seizure Tag for that location.

- Photograph the carcass with the completed blue Identification Tag visible next to the carcass.
- Fill in the carcass information on the carcass collection form including: species identification (if known), lat/long of carcass collection location (decimal degrees, WGS 84), ID# (blue Evidence Identification Tag item number (assigned sequential number, i.e., 001, 002...010); field photograph number; and amount/description of oiling. Determinations on carcass condition, scavenging, and emaciation should be made by experienced personnel as time allows.
- Carcass handling procedure -**It is important that oiled carcasses do not touch plastic bags.** For simplicity, follow this same handling process with fresh, Not Visibly Oiled (NVO) carcasses, as well:
 1. First place the carcass in a paper bag, then place the paper-bagged-carcass in a plastic bag.
 2. Do NOT place used gloves in the bag with the carcass.
 3. Securely attach the completed blue Evidence Identification Tag to the outside of the plastic bag.
- Record the GPS location for each carcass on the “Bird Search Effort and Birds Collected Form.”
- Complete the white Seizure Tag with information from all of the blue Identification Tags associated with this location. One member of the collection team should become responsible for this and their name should appear on the Seizure Tag.
- After the carcass(es) has been appropriately bagged and tagged, the accompanying white Seizure Tag should be filled in to include: the date and time; number of carcasses collected;

all blue Identification Tag numbers associated this same location; and the name of the person collecting the carcasses.

ADDITIONAL NOTES:

- If you collect multiple carcasses from one location which have different dispositions (some to LE and some to NRDA), fill out a separate datasheet and white Seizure Tag to represent all carcasses for each different disposition. In other words, all oiled carcasses should be recorded on one data sheet and Seizure tag which goes to LE, and all NVO on another data sheet and Seizure tag which goes to Fairhope NRDA. Remember not to exceed 10 carcasses per Seizure Tag.
- For all oiled carcasses collected, make a copy of the completed datasheets. Leave the ORIGINAL with the carcass at the Intake Center. Provide the copy to the Fairhope NRDA field office.

**MS Canyon 252 Deepwater Horizon Oil Spill
USFWS OFFICE OF LAW ENFORCEMENT
Designated OILED CARCASS Intake Centers
Fresh (intestines intact) oiled carcasses only
are to be sent to Law Enforcement at the locations below
(Wildlife rehab center contact info is listed for your information).**

FWS LE Liaison Wildlife Rehab Center Coordinators	Officer Wesley Verrill Jr. Resee Collins Carmen Simonton	(573) 999-1694 (404) 314-6526 (404) 576-3874	wesley_verrill@fws.gov resee_collins@fws.gov carmen_simonton@fws.gov
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ALABAMA

Environmental Studies Center 6101 Girby Road Mobile, Alabama	Susan Clemens	(251) 221-5000	LIVE OILED BIRDS ONLY No Carcasses
Alabama Office of Law Enforcement	Special Agent Donnie Grace	(251) 202-1556	donnie_grace@fws.gov

FLORIDA

Wildlife Sanctuary of NW Florida 105 North "S" Street Pensacola, Florida	Dorothy Kaufmann	(850) 433-9453	LIVE OILED BIRDS ONLY No Carcasses
Florida Office of Law Enforcement	Special Agent Downie Wolfe	(904) 545-2612	downie_wolfe@fws.gov

LOUISIANA

Wildlife Rehab Center 200 Lear Drive Hammond, Louisiana	Erica Miller Heather Neville	(985) 345-8261	LIVE OILED BIRDS ONLY No Carcasses
Louisiana Office of Law Enforcement	Special Agent Phillip Siragusa	(337) 288-2810	phillip_siragusa@fws.gov

MISSISSIPPI

Humane Society of South MS 2615 25th Avenue Gulfport, Mississippi	Casey Sartin	18-5133	LIVE OILED BIRDS ONLY No Carcasses
Mississippi Office of Law Enforcement	Special Agent Ben Bryant	14-7115	ryant@fws.gov

NOT VISIBLY OILED Carcasses

FWS NRDA Field Office <u>Contact Bird Planner or Bird Lead to arrange for disposition in New Orleans</u>	Bird Lead	(251) 442-7416	FW4_NRDA_Bird@fws.gov And/or Bird Planner email
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NRDA Carcass Collection AT A GLANCE

The Condition ¹ of the Carcass is:	And Oiling ² Status is:	And the bird is "Marked" or Listed? ³	Should you Collect?	Disposition and/or Action Guideline
Fresh (Intestines Intact)	Oiled	Yes	Yes	Disposition per LE Designated Intake Centers; make a copy of data sheet (original stays w/bird, copy to NRDA Bird Lead); notify NRDA Bird Lead in Fairhope.
		No	Yes	
	Not Visibly Oiled	Either Yes or No	Yes	Cold storage for retention by NRDA, <u>contact NRDA Bird Lead to arrange</u> for cold storage at 3401 Alvar St., New Orleans, 70126 (504-895-4826).
Recent	Oiled or Not Visibly Oiled	Either Yes or No	Yes	
Old	Oiled or Not Visibly Oiled	Yes	Yes	
		No	No	Leave in place. Mark with zip-tie to indicate carcass has been observed.

¹ A "Fresh" bird has intestines intact. "Recent" is defined as any largely-intact bird with feathers, including flat, dry carcasses (e.g., one wing attached to body, carcass without head, etc). "Old" is defined as a carcass consisting only of bones and/or isolated portions of a bird (e.g., head only, etc).

² "Oiling" means oil is present and visible to the naked eye, including light or trace oil.

³ "Marked" is defined as having a bird band, tag or telemetry equipment associated with the remains. Record bird band, tag, and/or satellite transmitter information. Bands and tags stay on bird; transmitters go to NRDA Bird Lead. "Listed" means it is a species that is protected as Threatened or Endangered under the ESA.

Table updated: January 13, 2011

The following informational figures and lists are reproduced here from the original Carcass Collection Protocol (NRDA Bird Study #1) (Nov 14, 2010):

Evidence Seizure Tag:

EVIDENCE SEIZURE TAG
 UNITED STATES DEPARTMENT OF THE INTERIOR
 U.S. Fish and Wildlife Service

SEIZURE TAG NO. 899766

DATE, TIME OF SEIZURE: 5/29/2010 1300 FILE NO. INV.

TAKEN FROM: (PERSON AND/OR LOCATION)
 RECEIVED FROM:
 FOUND AT: Gulfport, MS

30.235343
 86.432243
 WGS 84

DESCRIPTION OF EVIDENCE:
 001) Northern Gannet - Oiled
 002) Unknown bird
 003) Laughing gull

SPECIAL AGENT/INSPECTOR: Collector's name BADGE NO.

FOI883-407 (Rev. 7/81) U.S. GOVERNMENT PRINTING OFFICE: 2005 285 071

SEIZED PROPERTY RECEIPT

DATE, TIME OF SEIZURE: SEIZURE TAG NO. 899766

DESCRIPTION:
 Leave blank and attached

SPECIAL AGENT/INSPECTOR: BADGE NO.

CHAIN OF CUSTODY: Listed item(s) transferred from custody of officer listed on reverse side of this tag to:

DATE:	PRINTED NAME:	INITIALS:
5/29/10	Second person	SP
5/31/10	Third person	TP

RETURN ACKNOWLEDGEMENT: I hereby acknowledge that the article(s) listed on the reverse side of this tag have been returned to me in as good a condition as when they were seized by the indicated officer.

RECEIPT SIGNATURE: DATE:

WARNING: the material to which this tag is affixed is in the custody of the United States Government and must not be tampered with under penalty of law: 16USC2232.

DEPARTMENT OF THE INTERIOR
 U.S. FISH AND WILDLIFE SERVICE

BLUE EVIDENCE TAG:

The diagram shows a blue evidence tag with a circular hole on the left side. The tag is titled "EVIDENCE IDENTIFICATION TAG" and contains a table with the following fields:

SEIZURE TAG NO.	ITEM NO.	DATE:
902641-001		5/29/2010
FILE NO.	TAGGED BY (INITIALS)	
	MKH	

Below the table, the text reads: "DEPARTMENT OF THE INTERIOR U.S. FISH AND WILDLIFE SERVICE GPO : U.S. GPO 2010-800-841 FORM 3-2052".

Callouts with red boxes and arrows point to specific fields:

- Top-left callout: "Seizure Tag No. This number can be reused for multiple Evidence Identification Tags collected at the same site." (points to 902641-001)
- Top-right callout: "ID# of individual bird from the Bird Search Effort and Birds Collected Data Form" (points to the empty ITEM NO. field)
- Right callout: "Date collected" (points to 5/29/2010)
- Bottom-left callout: "Leave blank" (points to the empty FILE NO. field)
- Bottom-right callout: "Collector's initials" (points to MKH)

Carcass collection kit (USFWS):

Incident-specific maps or shoreline segment maps, if available
Evidence Seizure Tags, Form 3-487 (white)
Evidence Identification Tags, Form 3-2052 (blue)
BIRD SEARCH EFFORT and BIRDS COLLECTED DATA FORMs
Chain-of-Custody Forms
Carcass collection protocol
Large paper bags (for otter carcasses)
Paper bags
Small plastic bags
Large plastic bags
Rubber bands or twist ties
Pencil and / or permanent pen (sharpie)
Evidence tape
Nitrile gloves
Flagging (for marking large marine mammal carcasses)

Carcass collection kit (non-USFWS):

Incident-specific carcass collection instructions
Paper bags
Small plastic bags
Large plastic bags
Rubber bands or twist ties
Pencil and / or permanent pen (sharpie)
BIRD SEARCH EFFORT and BIRDS COLLECTED DATA FORMs
Chain-of-Custody Forms
Tape
Nitrile gloves
Flagging (for marking marine mammal carcass locations)

Exhibit 1: Searcher Efficiency and Persistence Transect Locations

Figure 1. Marsh Edge Mortality Study Area



Figure 2. Western Focus area – Barataria Bay

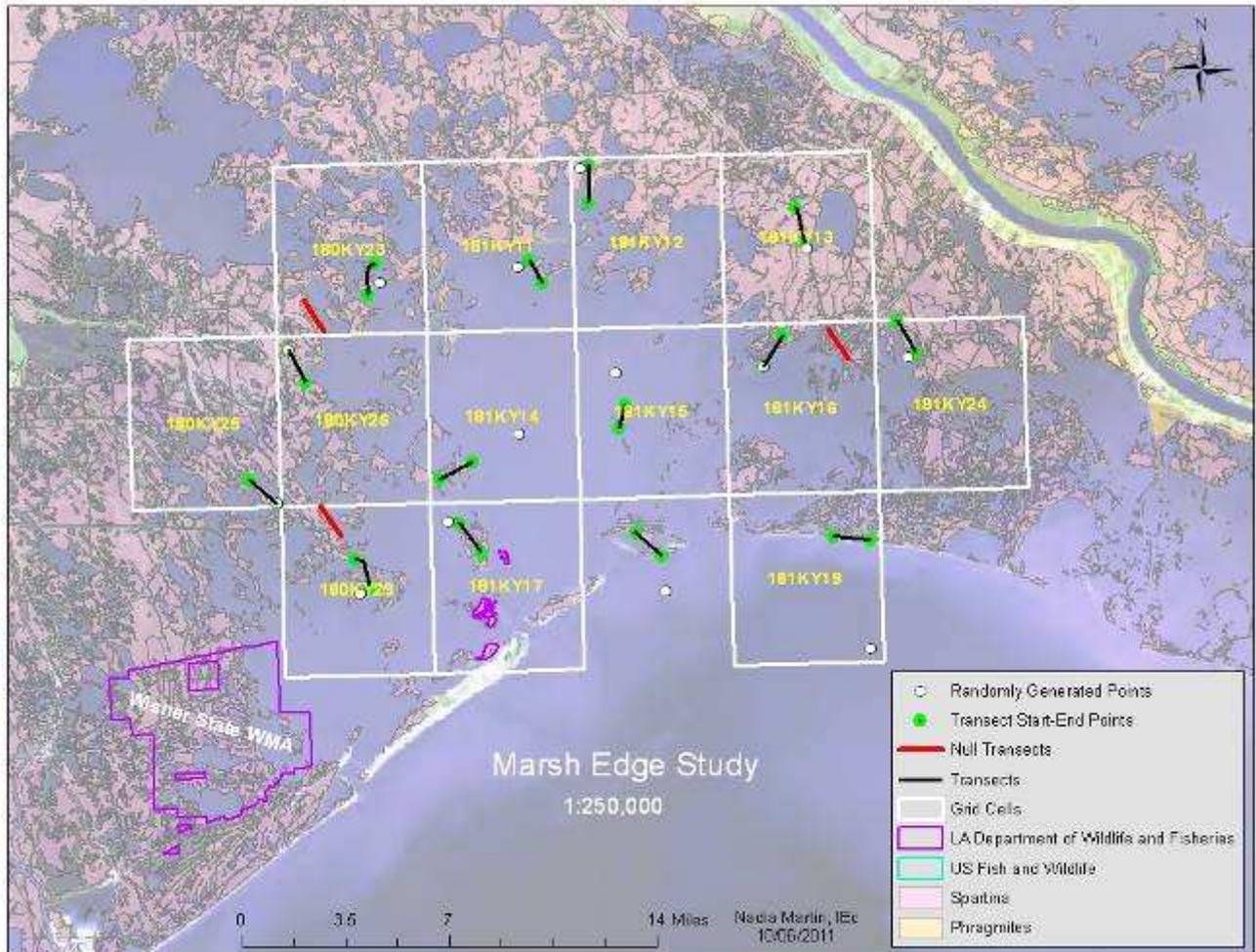


Figure 3. Eastern Focus area – Pass a Loutre

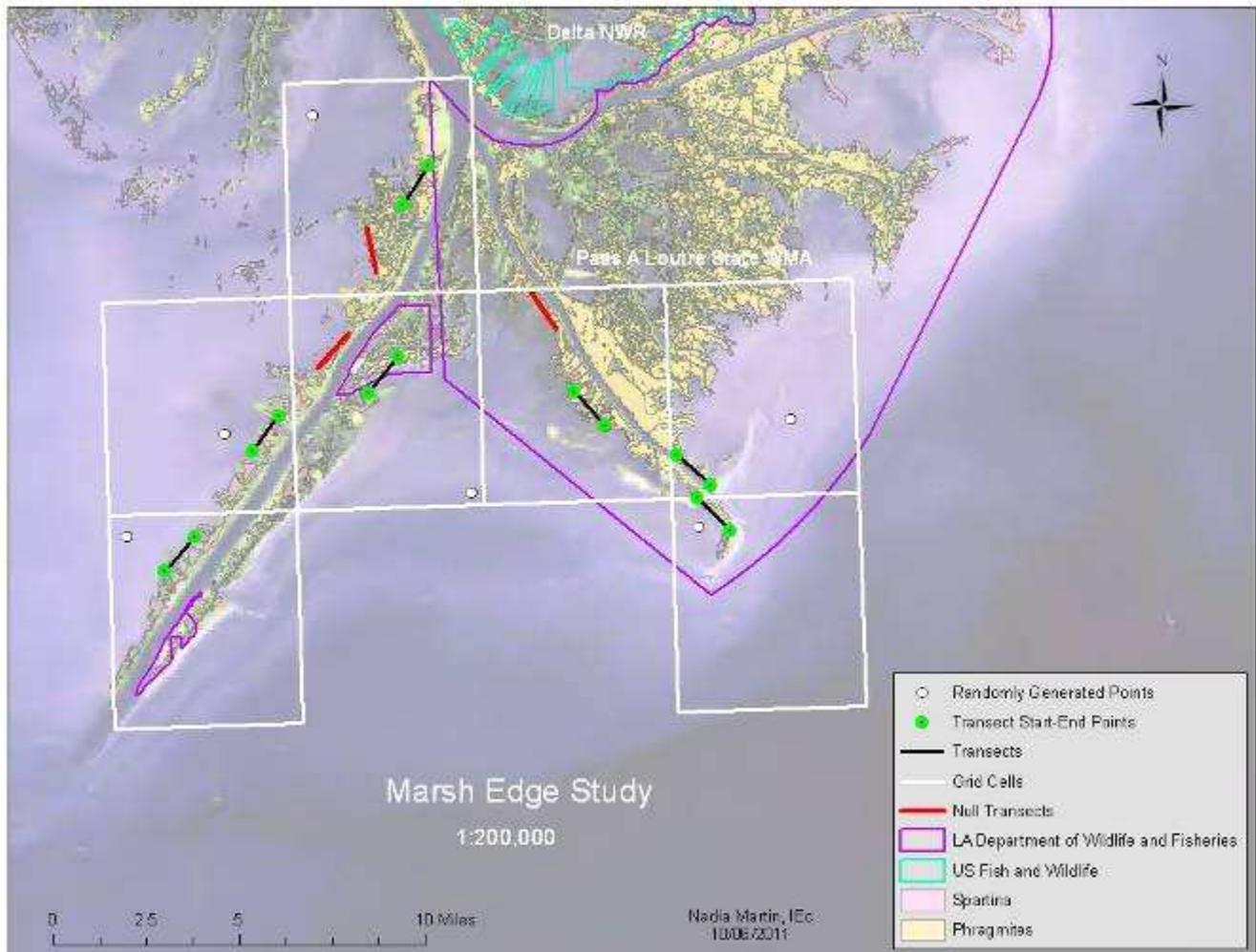


Table 1. Marsh Edge Mortality Study Transect Start and End Points

Transect	GARS	Lat	Long
1	180KY25	29.33490	-90.08540
1	180KY25	29.34680	-90.10050
2	180KY23	29.43580	-90.03200
2	180KY23	29.45150	-90.02740
3	180KY26	29.41020	-90.07680
3	180KY26	29.39390	-90.06760
4	180KY29	29.29260	-90.03460
4	180KY29	29.30700	-90.04270
5	181KY11	29.45070	-89.94110
5	181KY11	29.43950	-89.93410
6	181KY14	29.35300	-89.97580
6	181KY14	29.34520	-89.99440
7	181KY17	29.32340	-89.98410
7	181KY17	29.30870	-89.97210
8	181KY12	29.49680	-89.90710
8	181KY12	29.47870	-89.90750
9	181KY15	29.37920	-89.89000
9	181KY15	29.36770	-89.89340
10	181KY18	29.30470	-89.87150
10	181KY18	29.31640	-89.88590
11	181KY13	29.45580	-89.78750
11	181KY13	29.47350	-89.79160
12	181KY16	29.39580	-89.81280
12	181KY16	29.41080	-89.80110
13	181KY19	29.30940	-89.75550
13	181KY19	29.31190	-89.77580
14	181KY24	29.40080	-89.72750
14	181KY24	29.41670	-89.73700
15	182KY38	29.02380	-89.35190
15	182KY38	29.03700	-89.33940
16	182KX12	28.97800	-89.39260
16	182KX12	28.99090	-89.37830
17	182KY36	29.11820	-89.28150
17	182KY36	29.13290	-89.26940
18	182KY39	29.04530	-89.29930
18	182KY39	29.05900	-89.28580
19	182KY47	29.02930	-89.19520
19	182KY47	29.04310	-89.20850
20	182KY48	29.00450	-89.14890
20	182KY48	29.01700	-89.16380
21	182KX22	28.98670	-89.14100
21	182KX22	28.99990	-89.15500
Spit 1	n/a	TBD	TBD
Spit 1	n/a	TBD	TBD
Spit 2	n/a	TBD	TBD
Spit 2	n/a	TBD	TBD
Null	180KY29	29.31810	-90.05040
Null	180KY29	29.33330	-90.06120
Null	180KY23	29.41880	-90.05690
Null	180KY23	29.43410	-90.06790
Null	181KY16	29.39810	-89.76490
Null	181KY16	29.41350	-89.77590
Null	182KY39	29.05510	-89.32160
Null	182KY39	29.06860	-89.30780
Null	182KY36	29.09170	-89.29460
Null	182KY36	29.10940	-89.29820
Null	182KY47	29.06740	-89.21540
Null	182KY47	29.08280	-89.22630

Exhibit 3: Carcass Persistence Data Sheet

Mississippi Canyon 252 Oil Spill NRDA- Marsh Carcass Persistence Data Form (#19)										
Date:		Surveyors:				Surveyor Signatures:				
Survey Transect #										
Survey Transect Coordinates						Tide Level:				
Carcass ID	Species	GPS Location Prev. Day ¹	Dist. From Transect start (m)	Time (military format)	GPS Location Today	Distance from Edge ²	Robel Pole ³	Photo(s) ID# ⁴	Carcass State ⁵	Notes
								1m		
								5m		
								25m		
								1m		
								5m		
								25m		
								1m		
								5m		
								25m		
								1m		
								5m		
								25m		
								1m		
								5m		
								25m		

¹ Latitude/Longitude. WGS 84. Decimal degrees.
² Estimate distance in meters from edge of marsh.
³ Robel pole reading of vegetation density at time carcass is placed.
⁴ On placement day or days where carcass moved >25m from last location, take photos at 1m, 5, and 25m. Otherwise take photos at 1m and 5m (put a large "X" on line for 25m).
⁵ Use one of the following: "Int" (intact, equivalent to No Scavenging), "Dist" (disturbed, skin broken, mostly intact), "PR" (pectorals removed but organs present), "OR" (Organs removed but pectoral present, "SB" (Skin and bones only; pectorals and organs removed), "PG" (Fragmentary; pelvic girdle only), "Wing" (Fragmentary; one or both wings only), "Skin" (feathers attached to skin fragments), "Miss" (missing, no part of carcass remains; equivalent to removed). If "Missing or Miss" Record, write "N/A" in cells for GPS location and Distance from Edge.

Exhibit 4: Chain of Custody Forms

<small>US Department of the Interior U.S. Fish and Wildlife Service Division of Law Enforcement</small>			CHAIN OF CUSTODY RECORD		FILE NO. INV.
DATE AND TIME OF SEIZURE:		REGION: 4	EVIDENCE/PROPERTY SEIZED BY: (CP Team Leader)		
SOURCE OF EVIDENCE/PROPERTY (person and/or location): <input type="checkbox"/> TAKEN FROM: <input type="checkbox"/> RECEIVED FROM: <input type="checkbox"/> FOUND AT: Original data collection		CASE TITLE AND REMARKS: Deepwater Horizon NRDA Carcass Persistence Study (Bird Study 1A)			
ITEM NO. 001	DESCRIPTION OF EVIDENCE/PROPERTY (include Seizure Tag Numbers and any serial numbers): Camera memory card Brand: Memory capacity: ID # (if applicable): Dates used:				
ITEM NO. 001	FROM: (PRINT NAME, AGENCY)	RELEASE SIGNATURE:	RELEASE DATE:	DELIVERED VIA: <input type="checkbox"/> U.S. MAIL	
	TO: (PRINT NAME, AGENCY)	RECEIPT SIGNATURE:	RECEIPT DATE:	<input type="checkbox"/> IN PERSON <input type="checkbox"/> OTHER:	
ITEM NO.	FROM: (PRINT NAME, AGENCY)	RELEASE SIGNATURE:	RELEASE DATE:	DELIVERED VIA: <input type="checkbox"/> U.S. MAIL	
	TO: (PRINT NAME, AGENCY)	RECEIPT SIGNATURE:	RECEIPT DATE:	<input type="checkbox"/> IN PERSON <input type="checkbox"/> OTHER:	
ITEM NO.	FROM: (PRINT NAME, AGENCY)	RELEASE SIGNATURE:	RELEASE DATE:	DELIVERED VIA: <input type="checkbox"/> U.S. MAIL	
	TO: (PRINT NAME, AGENCY)	RECEIPT SIGNATURE:	RECEIPT DATE:	<input type="checkbox"/> IN PERSON <input type="checkbox"/> OTHER:	

ADDITIONAL TRANSFERS ON REVERSE SIDE

FORM 3-2063 (3/00)

US Department of the Interior U.S. Fish and Wildlife Service Division of Law Enforcement		CHAIN OF CUSTODY RECORD			FILE NO. INV.
DATE AND TIME OF SEIZURE:		REGION: 4	EVIDENCE/PROPERTY SEIZED BY: (CP Team Leader)		
SOURCE OF EVIDENCE/PROPERTY (person and/or location): <input type="checkbox"/> TAKEN FROM: <input type="checkbox"/> RECEIVED FROM: <input type="checkbox"/> FOUND AT: Original data collection		CASE TITLE AND REMARKS: Deepwater Horizon NRDA Carcass Persistence Study (Bird Study 1A)			
ITEM NO. 001	DESCRIPTION OF EVIDENCE/PROPERTY (include Seizure Tag Numbers and any serial numbers): Carcass Persistence Study datasheets (list datasheets by date and Transect Name)				
ITEM NO. 001	FROM:	(PRINT NAME, AGENCY)	RELEASE SIGNATURE:	RELEASE DATE:	DELIVERED VIA: <input type="checkbox"/> U.S. MAIL <input type="checkbox"/> IN PERSON <input type="checkbox"/> OTHER:
	TO:	(PRINT NAME, AGENCY)	RECEIPT SIGNATURE:	RECEIPT DATE:	
ITEM NO.	FROM:	(PRINT NAME, AGENCY)	RELEASE SIGNATURE:	RELEASE DATE:	DELIVERED VIA: <input type="checkbox"/> U.S. MAIL <input type="checkbox"/> IN PERSON <input type="checkbox"/> OTHER:
	TO:	(PRINT NAME, AGENCY)	RECEIPT SIGNATURE:	RECEIPT DATE:	
ITEM NO.	FROM:	(PRINT NAME, AGENCY)	RELEASE SIGNATURE:	RELEASE DATE:	DELIVERED VIA: <input type="checkbox"/> U.S. MAIL <input type="checkbox"/> IN PERSON <input type="checkbox"/> OTHER:
	TO:	(PRINT NAME, AGENCY)	RECEIPT SIGNATURE:	RECEIPT DATE:	

ADDITIONAL TRANSFERS ON REVERSE SIDE

FORM 3-2003 (3/90)