

U.S. Department of the Interior

Fifth Interim Partial Claim for Assessment and Restoration Planning Costs
20 April 2010 *Deepwater Horizon* (MC 252) Incident

Time Period: January – December 2015



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Attachment A: DOI Employees by Resource Category

EXECUTIVE SUMMARY

On April 20, 2010, an explosion and fire on the *Deepwater Horizon* mobile offshore drilling unit resulted in 11 worker fatalities and discharges of oil and other substances from the rig and seabed wellhead into the Gulf of Mexico. Pursuant to section 1006 of the Oil Pollution Act (“OPA”), 33 U.S.C. §§ 2701 *et seq.*, and Executive Order 13626, federal, state, and federally recognized tribes are trustees for natural resources and are authorized to act on behalf of the public to: (1) assess natural resource injuries resulting from a discharge of oil or the substantial threat of a discharge and response activities, and (2) develop and implement a plan(s) for restoration of such injured resources.

This document identifies assessment and restoration planning procedures, including studies, which agencies within the U.S. Department of the Interior (“Department” or “DOI”) are implementing in 2015 to inform natural resource damage injury determination, injury quantification, and restoration selection activities associated with the *Deepwater Horizon* Oil Spill (“Oil Spill”). This document is a supplement to the Department’s Interim, Partial Claim, dated July 1, 2011; the Second Interim Partial Claim, dated October 4, 2012; the Third Interim Partial Claim, dated October 8, 2013 and October 3, 2014, and the Fourth Interim Partial Claim, dated November 7, 2014, which identified assessment procedures that may have been performed in 2011, 2012, 2013, and 2014 and early restoration procedures that will be performed in 2015. The collection of activities identified in this Fifth Interim Partial Claim (“Claim” or “Fifth Claim”) reflect consideration of the factors identified in 15 C.F.R. § 990.27 (use of assessment procedures), § 990.51 (injury determination) and § 990.52 (injury quantification). The assessment activities also reflect consideration of data and analyses conducted during the pre-assessment phase of the *Deepwater Horizon* Natural Resource Damage Assessment (“DWH NRDA” or “this NRDA”). Restoration planning activities identified reflect consideration of the factors identified in 15 C.F.R. § 990.53 (developing restoration alternatives), § 990.54 (evaluation of alternatives), and § 990.55 (developing restoration plans). The Department also will be further developing and maintaining a document management system to support the Trustees’ efforts to develop an Administrative Record (AR), and will be evaluating injury assessment and restoration planning and implementation records for inclusion into the Administrative Record(s) (§ 990.61). Scientific information to support injury determination and quantification, although incomplete, is sufficient for the DWH NRDA Trustees to proceed with restoration planning. The Department’s assessment and restoration planning activities in this Claim are a subset of the DWH NRDA activities conducted by all Trustees. Department activities in this Claim document focus on impacted natural resources the Department directly manages – including endangered species, migratory birds, and DOI-managed lands and facilities. The

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Department expressly reserves its ability to supplement the assessment and restoration planning procedures identified herein.

This Fifth Claim covers the Department's assessment and restoration planning activities and estimated costs for 2015 that are unique from activities already paid for by BPXP or the U.S. Coast Guard. The document is organized to provide a description of the Department's proposed activities by resource category or major topic area. Contractor support (when requested) and Department staff costs, required to prepare a comprehensive injury assessment and restoration plan, are discussed for each of the activities and listed below. The Department has determined that it will need \$19,876,461 to complete NRDA activities described in this claim.

Exhibit 1 provides summary cost information for estimated contractor costs for assessment and restoration planning procedures included in this Claim. These proposed procedures include field studies, laboratory and data analysis, and data management, and total \$7,951,506. Exhibit 2 provides estimated costs for coordination, oversight, implementation and analysis activities for DOI personnel in 2015. Although different labor rates and total hours were estimated for a variety of DOI personnel, the total cost is used to cover expenses for approximately 136 administrative support specialists, scientists, restoration specialists, attorneys, and program managers working on the DWH NRDA. These costs total \$9,332,373.

As noted in Exhibits 1, 2 and 3, the Department has included a request for contingency funds for these activities. Contingency funds are intended to cover the risk that actual costs are higher than expected, and will only be made available upon documentation of higher than expected costs.

Data collection and analysis are ongoing, and may result in the identification of additional NRDA activities by the Department and/or its co-Trustees or, alternatively, the decision may be made to not pursue an activity identified in this Claim. The need for any additional studies and assessment activities and their relationship to existing data collection efforts and analyses, and data management, will be clearly identified in any future assessment claims. This Fifth Claim is not intended to, and does not, create any right or benefit, substantive or procedural, enforceable at law or in equity by any party against the United States, its departments, agencies, or entities, its officers, employees, or agents, or any other person.

Exhibit 1 – Injury Assessment Procedures Summary Budget – Contractor Support Costs

Activity	Contractor Support Costs	15% Contingency Amount
Birds		
Avian Injury Quantification	\$1,510,428	\$226,564
Estimation of 2010 Background Carcass Deposition (Bird Study #27)	\$129,644	\$19,447
Data Analysis for Background Oiling Rate for Live Birds	\$129,644	\$19,447
Integration of Migratory Bird Exposure and Injury Assessment	\$299,920	\$44,988
Injury to Birds Resulting from Habitat and Prey Exposure to the <i>Deepwater Horizon</i> / Mississippi Canyon (MC252) Oil Spill Analysis	\$40,000	\$6,000
Avian Toxicity Synthesis Report and Revised Oiled Bird Fate Matrix	\$258,000	\$38,700
Survivorship Analysis using Bird Telemetry Data	\$78,260	\$11,739
Endangered/ Threatened Species		
Endangered/Threatened Sea Turtles	\$0	-
Statistical Analysis of Nesting and Hatchling Trends for the Kemp's Ridley Sea Turtle	\$75,000	\$11,250
Gulf Sturgeon Injury Quantification	\$72,500	\$10,875
DOI Managed Lands and Facilities		
Assessing Submerged Oil Mats by Remote Sensing Survey and Diver Characterization a Gulf Islands National Seashore (GUIS)	\$0	-
Sand Beach Response Injury Quantification	\$38,594	\$5,789
Assessment of Submerged Aquatic Vegetation (SAV)	\$0	-
Injury Assessment, Management, and Administration		
Technical and Logistical Support for DOI's Deepwater Horizon Oil Spill NRDA	332,440	\$49,866
Comprehensive Database for DOI-lead Studies, Analytical and Observation Data, Infrastructure and Administration	\$900,000	\$135,000
Comprehensive Document Management System for Assessment Administrative Record	\$1,500,000	\$225,000

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Activity	Contractor Support Costs	15% Contingency Amount
Economist Technical Assistance	\$762,076	\$114,311
Expert Statistical Support	\$125,000	\$18,750
Aerial Imagery	\$0	-
Restoration Planning		
Damage Assessment and Restoration Plan (DARP) and Programmatic Environmental Impact Statement (PEIS), and Associated Regulatory Compliance	\$1,500,000	\$225,000
Coordination, Oversight, Implementation, and Analysis		
DOI Injury Assessment, Restoration Planning, and Case Management	\$200,000	\$30,000
Total	\$7,951,506	\$1,192,726

Exhibit 2 – Injury Assessment Procedures Summary Budget – DOI Staff Salaries

Activity	DOI Salary Costs	15% Contingency Amount
Birds		
Avian Injury Quantification		
Estimation of 2010 Background Carcass Deposition (Bird Study #27)		
Data Analysis for Background Oiling Rate for Live Birds		
Integration of Migratory Bird Exposure and Injury Assessment		
Injury to Birds Resulting from Habitat and Prey Exposure to the <i>Deepwater Horizon</i> / Mississippi Canyon (MC252) Oil Spill Analysis		
Avian Toxicity Synthesis Report and Revised Oiled Bird Fate Matrix		
Survivorship Analysis using Bird Telemetry Data		
DOI Staff Time Related to Birds	\$2,000,000	\$300,000
Endangered/ Threatened Species		
Endangered/Threatened Sea Turtles	\$700,000	\$105,000
Statistical Analysis of Nesting and Hatchling Trends for the Kemp's Ridley Sea Turtle	\$150,000	\$22,500
Gulf Sturgeon Injury Quantification	\$95,000	\$14,250
DOI Managed Lands and Facilities		
Assessing Submerged Oil Mats by Remote Sensing Survey and Diver Characterization a Gulf Islands National Seashore (GUIS)	\$15,000	\$2,250
Sand Beach Response Injury Quantification	\$46,500	\$6,975
Assessment of Submerged Aquatic Vegetation (SAV)	\$25,000	\$3,750
Injury Assessment, Management, and Administration		
Technical and Logistical Support for DOI's Deepwater Horizon Oil Spill NRDA	\$450,000	\$67,500
Comprehensive Database for DOI-lead Studies, Analytical and Observation Data, Infrastructure and Administration	\$85,000	\$12,750
Comprehensive Document Management System for Assessment Administrative Record	\$575,000	\$86,250

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Activity	DOI Salary Costs	15% Contingency Amount
Economist Technical Assistance	\$65,000	\$9,750
Expert Statistical Support	\$35,000	\$5,250
Aerial Imagery	\$625,000	\$93,750
Restoration Planning		
Damage Assessment and Restoration Plan (DARP) and Programmatic Environmental Impact Statement (PEIS), and Associated Regulatory Compliance	\$1,150,000	\$172,500
Coordination, Oversight, Implementation, and Analysis		
DOI Injury Assessment, Restoration Planning, and Case Management	\$3,315,873	\$497,381
Total	\$9,332,373	\$1,399,856

Exhibit 3 –Total

	AC Cost	15% of AC Cost (Contingency)	Total AC
Assessment Procedure Costs	\$7,951,506	\$1,192,726	\$9,144,232
DOI Personnel Costs	\$9,332,373	\$1,399,856	\$10,732,229
Grand Total	\$17,283,879	\$2,592,582	\$19,876,461

1. ADMINISTRATIVE INFORMATION

1.1. Claimant Eligibility and Coordination with Co-Trustees

The following governmental entities are designated natural resource Trustees under OPA and Executive Order 13626 and are currently acting as Trustees for this Incident¹:

- the U.S. Department of the Interior, as represented by the National Park Service (NPS), the Fish and Wildlife Service (FWS), and Bureau of Land Management (BLM);
- the National Oceanic and Atmospheric Administration (NOAA), on behalf of the United States Department of Commerce;
- the Environmental Protection Agency (EPA)
- the US Department of Agriculture (USDA);
- the United States Department of Defense (DOD);
- the State of Florida’s Department of Environmental Protection; and Florida Fish and Wildlife Conservation Commission;
- the State of Alabama’s Department of Conservation and Natural Resources and Geological Survey of Alabama;
- the State of Mississippi’s Department of Environmental Quality;
- the State of Louisiana’s Coastal Protection and Restoration Authority, Oil Spill Coordinator’s Office, Department of Environmental Quality, Department of Wildlife and Fisheries and Department of Natural Resources;

¹ In this Claim, the *Deepwater Horizon*/MC 252 Oil Spill is referred to as “Oil Spill” or “Incident” which may include, as applicable, all incident(s) related to the events of the explosion, fire and subsequent discharges of oil and other substances from the rig and wellhead on the seabed into the Gulf of Mexico.

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- the State of Texas' Parks and Wildlife Department, General Land Office, and Commission on Environmental Quality (collectively, the Trustees).

In addition to acting as Trustees for this Incident under OPA, the states of Florida, Alabama, Mississippi, Louisiana, and Texas are also acting pursuant to their applicable state laws and authorities, including the Louisiana Oil Spill Prevention and Response Act of 1991, La. R.S. 30:2451 *et seq.*, and accompanying regulations; La. Admin. Code 43: 101 *et seq.*; the Texas Oil Spill Prevention and Response Act, Tex. Nat. Res. Code, Chapter 40, Section 376.011 *et seq.*; Fla. Statutes, and Section 403.161, Fla. Statutes; the Mississippi Air and Water Pollution Control Law, Miss. Code Ann. §§ 49-17-1 through 19-17-43; and Alabama Code §§ 9-2-1 *et seq.*, and 9-4-1 *et seq.*

Several technical teams exist, each comprised of Trustee representatives and led by the Trustees to guide and coordinate data collection and analysis for this NRDA. As appropriate, these technical teams coordinate with and consider input from BP Exploration and Production, Inc. (BPXP) on technical team activities. The procedures identified in this Claim are planned to be implemented and/or overseen by DOI personnel, were developed in coordination with the Department's co-Trustees, and include technical team review.

Funds previously received by the Department from BPXP and/or the U.S. Coast Guard's National Pollution Fund Center (NPFC) have not been applied to any of the proposed activities in this Claim.

1.2. Responsible Party Information

The Responsible Parties (RPs) identified for this Incident thus far are BPXP; Transocean Holdings Inc. (Transocean); Triton Asset Leasing GmbH (Triton); Transocean Offshore Deepwater Drilling Inc. (Transocean Offshore); Transocean Deepwater Inc. (Transocean Deepwater); Anadarko Petroleum (Anadarko); Anadarko E&P Company LP (Anadarko E&P); and MOEX Offshore 2007 LLC (MOEX). Pursuant to 15 C.F.R. § 990.14(c), concurrent with the publication of the Notice to Conduct Restoration Planning, the Trustees invited the RPs identified above to participate in an NRDA. The Trustees have coordinated with BPXP, the only RP who accepted this invitation to actively participate in the DWH NRDA process.

1.3. Determination of Jurisdiction

For reasons identified in the Notice of Intent to Conduct Restoration Planning for this Incident, the Trustees determined they have jurisdiction to pursue restoration under OPA 75 Fed. Reg. 60800 (Oct. 1, 2010).

1.4. Time Limitations on Claims

This Claim for funding of reasonably necessary assessment and restoration planning procedures to inform Incident-specific injury determination and quantification analyses is presented in writing to the Director, National Pollution Funds Center (NPFC) within time limits specified in 33 C.F.R. § 136.1010 (i.e., within three years from the date of completion of the natural resources damages assessment). The NRDA for this Incident is not complete.

1.5. Legal Action

On December 15, 2010, the United States filed its complaint against the RPs in the Eastern District of Louisiana (Civil Case no. 2:10-cv-04536). At this time, the trial for damages for injury to natural resources has not been scheduled.

1.6. Claim Presentation

This Fifth Interim, Partial Claim for Assessment and Restoration Planning Costs has been presented for a sum certain, in accordance with OPA to BP Exploration & Production Inc. (BPXP) by letter dated January 30, 2015.

2. ASSESSMENT: OVERVIEW OF APPROACH

OPA regulations provide that NRDA procedures be tailored to the circumstances of the incident and the information needed to determine appropriate restoration. With respect to standards for assessment procedures, the regulations provide that (15 C.F.R. § 990.27(a)):

1. the procedure(s) must be capable of providing assessment information of use in determining the type and scale of restoration appropriate for a particular injury;
2. the additional cost of a more complex procedure must be reasonably related to the expected increase in the quantity and/or quality of relevant information provided by the more complex procedure; and
3. the procedure must be reliable and valid for the particular incident.

OPA regulations identify several categories of assessment procedures available to Trustees, including but not limited to procedures conducted in the field or laboratory; model-based procedures, and/or literature-based procedures (15 C.F.R. § 990.27(b)). If a range of assessment procedures providing the same type and quality of information is available, the most cost-effective procedure must be used (15 C.F.R. § 990.17(c)). Finally, assessment procedures must contribute to injury determination (i.e., by establishing the spatial and temporal magnitude of exposure to oil, the pathways of exposure, and/or the presence of injury, as described in 15 C.F.R. § 990.51) and/or injury quantification (i.e., quantifying the

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degree, spatial and temporal extent of injury to natural resources and the associated reduction in services caused by the injury, as described in 15 C.F.R. § 990.52).

The goal of the Department's assessment is to determine how natural resources over which the Department exercises jurisdiction may have been impacted by the Oil Spill. Therefore, many of the Department's assessment activities focus on specific resources, such as the Department's national parks and wildlife refuges, migratory birds, and nesting sea turtles. However, these individual resources are an integral part of the larger Gulf of Mexico ecosystem. Thus, the Department's assessment activities also relate the resource-specific effects to a more holistic view of the effects of the discharged oil to the Gulf of Mexico ecosystem. The Department continues to provide leadership in certain areas of the assessment, such as birds, threatened and endangered species, and sand beaches. As of December 31, 2014, the Department completed or is participating in injury assessment activities conducted under more than 60 plans and plan addenda.

Many ongoing and proposed activities in 2015, including monitoring for possible recovery of impacted resources, involve the analysis of field data needed to inform estimates of the magnitude of injury and associated reduction in services. Models and literature-based methods also are used in selected investigations. The scale and cost of each proposed activity were carefully considered with co-Trustees, and represent a balance between the need for cost-effective assessment efforts and the geographic scale and complexity of this Oil Spill.

The Department determined the assessment procedures identified in this document meet the requirements set forth in the OPA regulations, and are integrated with (and not duplicative of) other NRDA data collection and analysis activities. In addition to coordinating with co-Trustees, the Department has coordinated these assessment procedures and the content of this Claim with NOAA's 2015 Claim (*NOAA Fourth Interim, Partial Claim for Assessment and Restoration Planning Costs, October 3, 2014*) to further ensure consistency and the complementary nature of the assessment and restoration planning activities. Modifications to the identified assessment procedures may be made due to the participation of BPXP in this NRDA pursuant to 15 C.F.R. § 990.14. A description of each assessment activity's purpose and related implementation information are provided in subsequent sections of this document.

The Department regularly posts final NRDA work plans on the Internet. For the official record of Trustee NRDA investigations, visit the *Deepwater Horizon* Oil Spill NRDA Administrative Record at the website listed below. As of October 10, 2014, the site contains links to 130 NRDA work plans. Many of these work plans provide detailed technical methods and implementation information, and are incorporated by reference into this Claim.

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NRDA work plans and study-related data

<http://www.gulfspillrestoration.noaa.gov/oil-spill/gulf-spill-data/>

NRDA Administrative Record

<http://www.doi.gov/deepwaterhoizon/adminrecord/index.cfm>

As described in NOAA's 2014 Interim Partial Claim, most of the earlier assessment work plans were focused intentionally on the data collection phase after the Oil Spill. However, more recent assessment plans for Department-led assessment activities address Trustee activities focused on data compilation, synthesis, analysis, interpretation, reporting, and restoration planning. Many of the Department's activities in this Claim are focused on the analysis and interpretation of scientific data necessary to quantify injuries from the Oil Spill, complete NRDA analyses, and plan for restoration. Some data collection, including a limited amount of field work, may still be proposed as a continuation of assessment of potential injuries identified in the first days of the Oil Spill or to reduce uncertainties in the injury determination, including possible monitoring of impacted resources recovery.

2.1. Overview of How DOI Estimated Assessment and Restoration Costs for Each Activity

The Department is planning to complete many NRDA assessment activities by the end of 2015. To this end, the 2015 Claim is largely based on the amount of technical effort required to develop the Department's interpretation of injuries to natural resources and services from the Incident and to conduct region-wide restoration planning with the co-Trustees. Data management, scientific documentation, and legal review of analyses and technical deliverables are included as part of this Claim. Also included in the cost estimates are the level of effort expected for the anticipated amount of co-Trustee and RP coordination, laboratory and other data analysis schedules, and the number of anticipated work products, including finalization of large environmental and chemical datasets. Some of the proposed assessment activities are extensions of analysis and interpretation efforts begun prior to 2015, which have not yet been completed for a variety of reasons, such as the seasonality of the data collection efforts, laboratory space limitations, and Trustee review of data and interpretive reports.

As detailed in the following sections of this Claim, the Department is presently requesting support in this IPC for contractor costs for the following activities:

- Avian Injury Quantification
- Estimation of 2010 Background Carcass Deposition (Bird Study #27)
- Data Analysis for Background Oiling Rate
- Integration of Migratory Bird Exposure and Injury Assessment

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- Injury to Birds Resulting from Habitat and Prey Exposure to the Oil Spill Analysis
- Preparation of Avian Toxicity Synthesis Report and Revised Oiled Bird Fate Matrix
- Survivorship Analysis using Bird Telemetry Data
- Statistical Analysis of Nesting and Hatchling Trends for the Kemp's Ridley Sea Turtle
- Gulf Sturgeon Injury Quantification
- Sand Beach Response Injury Quantification
- Comprehensive Database for DOI-lead Studies, Analytical and Observation Data, Infrastructure Development and Administration
- Preparation of a Comprehensive Document Management System for the Administrative Record
- Economist Technical Assistance
- Expert Statistical Support
- Preparation of Damage Assessment and Restoration Plan (DARP) and Programmatic Environmental Impact Statement (PEIS), and Associated Regulatory Compliance
- DOI Injury Assessment, Restoration Planning, and Case Management Activities

Department staff efforts related to particular injury assessment and restoration planning activities (some of which also have requests for contractor support) are identified and described in this Claim under the specific sections below. A description of each activity is provided in subsequent sections of this Claim.

The Department's Incident-wide case management and administration costs are included under Activity #21. These management and administration tasks include participation and leadership in Executive Council and Trustee Council subcommittees, budget and financial work, public affairs and communications, administrative support functions, and other overall case management. **Attachment A** lists the Department personnel involved in the case by resource category.²

As more information about the impacts of the Oil Spill becomes available, the Department expressly reserves its right to supplement the assessment procedures identified herein through additional claims for assessment and restoration planning costs. Modifications to the identified assessment procedures may be made as a result of the participation of BPXP in the NRDA pursuant to 15 C.F.R. § 990.14.

² Attachment A reflects the Department personnel involved in the case, by resource category, at the time this Claim was submitted. Staffing assignments may change thereafter.

3. Birds

The Oil Spill reached locations in many areas of the northern Gulf of Mexico in Texas, Louisiana, Mississippi, Alabama, and Florida, including in open water, bays, saltwater and brackish marshes, sand beaches, barrier islands, tidal mud flats, and mangrove stands. All these areas provide habitat for various species of birds that were impacted by the Oil Spill.

A diverse assemblage of bird species spend all or a portion of their lives in the Gulf of Mexico and along its shorelines. Over 120 species of birds rely on waters, beaches, barrier islands, and wetlands of the northern Gulf Coast for nesting and wintering. Breeding species of regional importance include oystercatchers, skimmers, gulls, terns, plovers, herons, egrets, and waterfowl. Marsh birds (i.e., rails, bitterns, sparrows) forage and nest in Gulf Coast marshes. The Gulf of Mexico is a key wintering area, providing habitat for the federally-listed threatened rufa red knot (*Calidris canutus rufa*) and federally-designated critical habitat for the federally-listed threatened piping plover (*Charadrius melodus*). Additionally, the northern Gulf Coast supports nearly half of the southeastern population of brown pelicans and also includes portions of three of the four major migration flyways in North America: the Central, Mississippi, and Atlantic Flyways.

The Department has federal lands in the northern Gulf that support birds. These include Gulf Islands National Seashore, Breton National Wildlife Refuge, Bon Secour National Wildlife Refuge, and others. For example, the Breton National Wildlife Refuge supports one of the world's largest colonies of sandwich terns.

Birds can become oiled while floating, wading, feeding, and walking along beaches and marshes. For example, brown pelicans float on the water near shore and in bays. While flying, they regularly dive into the water to catch and eat fish. Both of these activities have the potential to result in a brown pelican becoming oiled if oil is present. Shorebirds such as sanderlings, which often inhabit sandy beaches and feed along the tide line, could become oiled while on the beach or while trying to catch small invertebrates and mollusks along the tideline. Similarly, clapper rails, which inhabit salt marshes and mangrove swamps, could become oiled while they wade and forage for small crustaceans, crabs, and minnows. Numerous birds feed on estuarine fish, shellfish, crustaceans, bivalves, and many other foods found in Gulf waters and along shores and marshes. By doing so, they risk skin and feather contact and ingestion of oil.

Avian injury resulting from a spill may be identified through various impacts including but not limited to mortality, changes in reproductive success (e.g., changes in reproductive behavior, decreases in successful hatch), and other sub-lethal effects. Direct exposure to oil interferes with the structure of feathers and reduces water repellency and insulation. This causes birds to lose buoyancy and sink or lose the ability to stay warm. Oiled birds often

display diminished abilities to fly, search for food, or swim and float, all of which can lead to mortality. In addition, birds may ingest oil while preening (cleaning their feathers), by consuming contaminated vegetation or prey, or by incidental ingestion of contaminated sediment. Oil ingestion may either kill the bird immediately or lead to long-term physiological, metabolic, developmental, and behavioral effects. These long-term effects ultimately reduce survival and reproduction. Oil transferred from adult bird feathers to their eggs or young can reduce the hatching of eggs and survival of young.

In addition to direct oil exposure, birds are also negatively affected by habitat degradation, loss of habitat, decreased prey abundance, and physical disturbance. Vegetation used for roosting or nesting may die back if oiled, resulting in a loss of available habitat. Oiling of sand and mud may reduce invertebrate populations, which are important prey resources for foraging birds. Colonial nesters may be forced to abandon nests due to frequent spill-related cleanup activities. Such changes in habitat quality/availability and prey resources exert secondary impacts on birds that already may be suffering physiological effects of oil exposure.

Oiled birds were observed shortly after the Oil Spill began, and continued to be observed into the spring of 2011, almost a year after the spill began and more than half a year after the wellhead was capped. More than 8,500 birds were recovered in the northern Gulf of Mexico as part of wildlife response and NRDA operations. These birds represent more than 100 species collected from areas along all five Gulf States. As is common in all wildlife mortality events, the number of birds recovered represents only a fraction of the birds that were killed or incapacitated by the Oil Spill.

The Trustees are quantifying the number of birds killed by exposure to oil using two primary approaches. The first approach, the Beached Bird Model (BBM), is being used to estimate avian mortality during the part of the Spill Incident when active searches for dead and dying birds were taking place. The BBM incorporates factors to account for affected birds that were not recovered. These factors include the deposition and persistence of birds on shorelines, the ability of survey crews to locate and recover birds, the deposition of carcasses under non-spill conditions, and other factors. A number of studies were conducted to generate this information for inclusion in the model. While this model is still under development, preliminary data suggest that tens of thousands of birds likely died within the initial five months of the Oil Spill.

A second approach, the Live Oiled Bird Model (LOBM), is being used principally to estimate the number of oil-exposed birds that died after the period of active bird searches. This model incorporates factors such as the numbers of birds occurring in areas affected by the Oil Spill (abundance), the incidence and degree to which birds were oiled (oiling rates), and the fate of oiled birds (e.g., the likelihood an oiled bird would die). A number of studies

were conducted to generate this information for inclusion in the LOBM, some of which are ongoing; the model is still under development.

In addition to these two models, the Trustees also are utilizing additional approaches for identifying and quantifying bird injuries from the Oil Spill that may not be captured in the two primary approaches listed above.

One of these additional approaches is the quantification of bird injury resulting from response actions and cleanup activities. Cleanup operations on beaches, an important habitat and nesting area for many bird species, ranged from lightly to heavily intrusive. Alteration of local habitat during cleanup operations can impact species-specific site selection, behavior, and nest success (reproductive success). Beach-cleaning activities, which included the use of heavy construction equipment during response activities, could increase egg and nestling exposure to harsh weather conditions, or cause premature departure from nests by fledglings, individual adult nest abandonment, or entire colony abandonment of nests. While best management practices (BMPs) were developed and used to mitigate impacts to birds and other resources, nevertheless, some impacts occurred. Due to the immense spatial and temporal scope of the incident, nesting and non-nesting birds were subject to some unavoidable impacts even with the use of BMPs.

Another potential type of injury relates to the effect of oil on *Sargassum*. *Sargassum* is an important resting and forage resource for pelagic birds, gulls, pelicans, and other birds. In addition to the oiling of marshes, beaches, and mudflats, floating mats of *Sargassum* were oiled during the course of the Oil Spill. Initial analysis indicates that more than 150 square miles of *Sargassum* were oiled. The impact this may have had on the birds that depend on this habitat for resting and foraging is uncertain; however, oiling of this resource would 1) provide an avenue of direct oiling of birds, 2) provide a pathway for oil ingestion by birds, and 3) directly reduce food available to birds in the form of marine fish and invertebrates that are associated with the *Sargassum* mats.

Both oiling of the shoreline as well as the response actions taken to address the oiling can also reduce food availability for birds. For example, the wrack zone, the area on the shore at the high tide line and where aquatic plants, animals, and natural debris are deposited, is an important feeding area for birds. Hundreds of miles of wrack were removed from beaches as part of the response action.

Additionally, oiling of both marsh and beach causes a reduction in invertebrate species, which may, in turn, negatively impact birds dependent upon them for food. The intrusive response activities taken on beaches, and the prolonged time period over which they were taken (months to years) only exacerbate the potential for foraging impacts, since both the re-oiling and the cleanup would impede the rate of recovery of these important forage species.

The extent of the Oil Spill increases the likelihood of these indirect impacts. During other spills it may have been possible for birds to relocate to nearby, non-impacted areas. The extent of this spill, however, makes this relocation less likely.

DOI Avian Injury Assessment Activities

To develop the overall injury assessment strategy, Department staff engaged in an intense collaborative effort that included both regional and national experts, co-Trustee technical staff, as well as BPXP and their technical consultants. A substantial amount of careful planning with co-Trustees and BPXP occurred at the beginning of the Incident to ensure that all collected data and assessment information pertaining to birds would be of use in determining the type and scale of restoration appropriate for a particular avian injury. To evaluate potential injury, assessment concepts were developed, which required lengthy literature reviews, additional consultation with experts, and collaboration with members of appropriate technical teams, as well as with BPXP and their technical consultants.

From these collaborative efforts a series of study plans, based on the best available science, has been designed to collect reliable and valid data to be used in determining the avian injury. Department staff manage the preparation of individual work plans, develop plan goals and objectives, and identify appropriate data types. Once these factors are agreed upon, Department staff develop preliminary drafts of work plans and standard operating procedures (SOPs) for data collection, obtain Department review and approval, and facilitate technical team, co-Trustee, and BPXP (where appropriate) review and approval. Work plans and SOPs are modified as appropriate based on technical input from co-Trustees, BPXP, and their contractors.

Some studies evaluate injury to a wide range of bird species while others focus on specific avian guilds or species. Department staff continue to manage the efforts of numerous work plans including those for colonial waterbirds, secretive marsh birds, breeding shorebirds, non-breeding shorebirds, pelagic birds, raptors, wintering waterfowl, wintering open-water waterbirds, and the piping plover.

Work plan implementation requires Department staff to participate in the development of contracting documents such as scopes of work and performance plans, and their review and approval by contracting officers and attorneys. Department staff also participate in contractor selection and pre-award meetings. Staff serve as contracting officer representatives, and routinely provide input and oversight for development of protocols for data collection and specimen handling, chain of custody requirements, data entry, data quality review, analysis, and reporting.

Extensive co-Trustee and principal investigator coordination by Department staff is necessary for each avian injury assessment activity beginning with identification and

development of the study, and extending through oversight of end of study report preparation, and approval of those reports. The Department staff continue to bring all avian injury determination activities to the final report stage. Many of these efforts are ongoing and are designed to improve the accuracy of the avian injury quantification models.

Additionally, Department staff continue to work collectively to integrate the findings of each assessment activity into the comprehensive and holistic picture of avian injury resulting from this spill. The most complete and scientifically defensible quantification of avian injury can only be realized through the careful consideration, together with our co-Trustees, of the various contributions of each study.

Overview of DOI avian injury assessment activities:

1. Beach Bird Model Surveys and Supporting Studies

From May through September 2010, Department staff and contractors surveyed designated shoreline transects to collect information needed for the BBM, such as length of the shoreline searched, frequency of searches, and numbers of bird carcasses and impaired live birds recovered. The Department conducted additional studies to generate information needed to reduce uncertainty in the BBM, such as the persistence of bird carcasses on Gulf shorelines, the ability of survey crews to effectively search and recover birds, the probability that a bird that died on the water would be deposited on a shoreline, and the deposition of bird carcasses under non-spill conditions. Data generated under these activities have been incorporated in the BBM. In 2015, the Department will work to complete the BBM through the incorporation of additional data, the processing of various model input, and the refinement of the overall model.

2. Aerial Bird Surveys

Aerial surveys were conducted to document the densities and abundance of birds in areas potentially affected by the Oil Spill. Data acquired in the surveys support the LOBM and other avian injury studies. Surveys include offshore (pelagic) transects, shoreline surveys, marsh transects, and breeding colony surveys. Aerial surveys have been completed and the data validation effort is ongoing. In 2015, validated aerial survey data will be integrated into the LOBM, and the Department and co-Trustees will continue interpretation of results that will be used in the quantification of avian injury.

3. Marsh Birds

Injury to marsh birds is being assessed using a combination of surveys to evaluate relative densities, oiling rates, and a comparison of mortality rates in oil-impacted areas and non-impacted reference areas. Density estimates were derived using secretive marsh bird callback surveys, fiddler crab density estimates (a principal clapper rail food), and helicopter surveys. Oiling rate estimates were obtained by the capture and examination of marsh birds using

visible and ultraviolet light. Mortality rate estimates of two representative species (clapper rails and seaside sparrows) in oiled and un-oiled habitats are being estimated using radio telemetry techniques, literature review, and avian toxicity testing.

In 2015, the Department will be working to finalize the remaining density estimate study reports as the information provided by these studies is directly related to our marsh bird injury quantification efforts. Further analyses of marsh bird telemetry data (collected in 2010 and 2011) by both Departmental staff and contractor support staff is also planned in 2015. These data will help the co-Trustees determine the differential survival probability between marsh birds inhabiting oiled areas and marsh birds inhabiting unoiled reference areas.

4. Colonial Waterbirds

Injury to colonial nesting birds was assessed by using a combination of surveys to: 1) estimate the abundance of colonial waterbirds within the northern Gulf of Mexico, 2) estimate the proportion of birds that were visibly oiled, and 3) determine the fate of externally oiled birds. Colonial waterbird abundance estimates were derived from aerial surveys. The incidence and degree of external oiling of birds were obtained by observers using binoculars to evaluate birds in colonies, roosting sites, and other bird congregations in the northern Gulf of Mexico. Survival rate estimates of oiled and un-oiled adult birds from three representative species (great egret, brown pelican, and black skimmer) are being derived using radio and satellite telemetry techniques, literature review, and avian toxicity testing. Field data collection efforts have been completed and the data validation effort is ongoing.

In 2015, validated colonial waterbird data will be integrated into the LOBM. The Department and co-Trustees will continue interpretation of LOBM results as it is our goal to finalize the LOBM report in late 2015 or early 2016.

5. Breeding Shorebird Study

Injury to nesting shorebirds was assessed by surveying breeding pairs of American oystercatchers and plover species throughout the Oil Spill's area of potential impact, documenting abundance, incidence and degree of external oiling, and disturbance by Oil Spill response activities. Data generated as part of the Breeding Shorebird Study were evaluated to estimate the proportion of adult birds that were oiled and to note disturbance related to Oil Spill response activities. We also evaluated inter-year (2010 and 2011) differences among beaches, States, and species.

The verification and validation (and thus finalization) of breeding shorebird data is ongoing. In 2015, these evaluations described above will be completed following the finalization of the survey data. In 2015 the Department will complete the technical report for use as a

technical appendix within the Trustees' final Damage Assessment and Restoration Plan (DARP).

6. Non-Breeding Shorebirds

Injury to wintering shorebirds was assessed by using a combination of surveys to: 1) estimate the abundance of shorebirds wintering within in the northern Gulf of Mexico, 2) estimate the proportion of birds that were visibly oiled, and 3) determine the fate of externally oiled birds. Shorebird abundance estimates were derived from aerial surveys. Oiling proportion estimates were obtained by observers using binoculars to evaluate birds in foraging and roosting sites from Texas to Florida. Survival rate estimates of oiled and un-oiled adult birds from one representative species (American oystercatcher) were derived using radio telemetry techniques, literature review, and avian toxicity testing. Field data collection efforts have been completed and the data validation effort is ongoing.

The non-breeding shorebird data are an essential input into the LOBM. In 2015, the verification and validation of the non-breeding shorebird data will be completed and these data will be integrated into the LOBM and the Department and co-Trustees will continue interpretation of results.

7. Pelagic Birds

Exposure and injury to pelagic seabirds were assessed by placing trained bird observers on ships to evaluate offshore seabird diversity and abundance as well as the incidence and degree of external oiling. Aerial surveys were also used to estimate seabird densities and abundance. Field data collection efforts have been completed and the data validation effort is ongoing.

Similar to the abovementioned data sets, the pelagic bird data are an essential input into the LOBM. In 2015, the verification and validation of the pelagic data will be completed and integrated into the LOBM, and the Department and co-Trustees will continue interpretation of results.

8. Piping Plover

Injury to federally-listed threatened piping plovers was assessed by estimating the number of piping plovers in oiled and reference areas during the winter, documenting the frequency and degree of oiling, and evaluating over-winter survival of piping plovers in these areas via color band marking and re-sighting activities. The Trustees also evaluated the return of marked piping plovers to the nesting areas in summer 2011.

In 2015, the Department will continue to work with co-Trustees to finalize the report on these data as we jointly interpret them with co-Trustees for use in the development of our avian injury quantification models.

9. Raptors

The Trustees evaluated potential Oil Spill-related mortality in two piscivorous raptors species: bald eagle and osprey. Studies included a rapid assessment of oiling effects and response activities on osprey reproduction in 2010, an assessment of bald eagle and osprey nests and reproductive productivity in 2011, and documentation of the presence of oiled nesting material in osprey nests in 2011.

In 2015, the Department will be working with co-Trustees to finalize the report on these data as we jointly interpret them with co-Trustees for use in the development of our avian injury quantification models.

10. Wintering Waterfowl

Injury to wintering waterfowl was assessed by estimating abundance and distribution within oil impacted marshes, open water habitats, and along beaches. Additionally, the Department documented dead and live oiled wintering waterfowl through boat surveys within aquatic habitats and open waters and through walking beach surveys. Target birds included diving ducks, dabbling ducks, and geese. A special focus was placed on resident mottled ducks known to over-winter within the Oil Spill area. The aquatic habitat surveys also evaluated oiling impacts on submerged aquatic vegetation, a habitat that provides principal dietary items for a number of waterfowl species. Field data collection efforts have been completed and the data validation effort is ongoing.

Similar to the abovementioned data sets, the wintering waterfowl survey data are an essential input into the LOBM. In 2015, the verification and validation of these data will be completed and integrated into the LOBM, and the Department and co-Trustees will continue interpretation of results.

11. Wintering Open Water Waterbirds

Injury to birds over-wintering in coastal open water habitats within the Oil Spill area were assessed by estimating, via aerial surveys, the abundance and distribution of target species: common loons, American white pelicans, and northern gannets. Oiling occurrence and extent were also documented using beach- and boat-based surveys. Field data collection efforts have been completed and the data validation effort is ongoing.

The wintering open water waterbird survey data are an essential input into the LOBM. In 2015, the verification and validation of these data will be completed and integrated into the LOBM, and the Department and co-Trustees will continue interpretation of results.

12. Colonial Waterbird Aerial Photography Census

Beginning in 2010 and continuing through 2013, aerial photographic surveys of waterbird breeding colonies in the northern Gulf of Mexico were conducted to evaluate potential

effects to colonial nesting birds. The identification and counting of nests and birds in these photographs were completed in 2014.

In 2015, validation of photographic census data will continue and the Department and co-Trustees will continue to interpret these data and incorporate them in our avian injury estimates.

13. Blood Physiology Assessment

Polycyclic aromatic hydrocarbons found in crude oil have been associated with a variety of adverse effects in birds, including oxidative damage to red blood cells and other physiological effects. Such effects may compromise a variety of vital functions in birds, like the ability to fly, swim, forage, migrate, and reproduce. This assessment activity evaluated whether hemolytic anemia and other physiological effects are key diagnostic features in birds oiled by the Oil Spill. Field data collection efforts have been completed, a draft technical report using the non-validated data has been written, and the data validation effort is ongoing.

In 2015, Department, contractor, and co-Trustee staff will complete the verification and validation of the blood physiology data and modify the draft report as needed. The blood physiology data are a key component of the fate determination of birds exposed to *Deepwater Horizon* Oil and thus a key component to the output of our LOBM. It is anticipated that the blood physiology report will exist as an important technical appendix within the Trustees' final DARP.

14. Avian Toxicity

The lethal effects to birds exposed to oil are well-known based on observations and research that followed many oil spills that occurred prior to the Oil Spill. These lethal effects also were seen following the Incident. In addition to the thousands of bird carcasses collected after the Oil Spill, there were many more birds observed oiled and still alive.

An extensive literature survey conducted by the Department has revealed that while there is a large body of work regarding some specific effects of oil spills on birds, a comprehensive assessment of the relationship between oil exposure and its effects on avian physiology and behavior does not exist. Literature studies show that when oil is ingested by birds at levels less than acutely lethal, the oil can cause a wide range of adverse effects, ranging from anemia (loss of oxygen-carrying capacity of blood), decreased nutrient absorption and energy absorption from food, altered stress responses, and decreased immune function. External oil exposure reduces a bird's thermoregulatory ability and can also affect flight performance. For the Oil Spill, these longer-term injuries to birds may be of particular importance for the very large number of birds that were exposed to oil but did not suffer immediate mortality.

The goal of the avian toxicity studies is an increased understanding of the toxicology, exposure, and longer-term effects of the Oil Spill on Gulf of Mexico relevant bird species, to help inform avian injury determination and quantification. The data generated from these studies are essential to the fate determination component of the Trustee's LOBM. There are four components to the avian toxicity efforts: 1) an oral dose-response study; 2) an external oiling dose-response study; 3) a metabolic, thermoregulatory, and flight performance effects study; and 4) a field-based flight effects study.

In 2015, the Department will continue to work with co-Trustees to finalize reports on completed Avian Toxicity Study components and will conduct further assessments of avian fate after oiling. Specifically, we will complete both scoping and comprehensive trials for external oiling of our selected surrogate bird species. These steps in the process are particularly important as they directly relate the field observation metric, visible oiling, to the fate of those birds exposed. We will also continue to incorporate relevant literature and expert opinion in the estimation of the fate of externally oiled birds. In 2015, oiled bird fate data will be integrated into the LOBM, and the Department and co-Trustees will continue interpretation of results.

15. Background Carcass Deposition

In 2013, the Department, in coordination with co-Trustees, requested adjudication from the NPFC for an assessment plan entitled *Background Deposition of Bird Carcasses on Walkable Shorelines and Marshes*. This plan was initially described in the Department's Second Interim, Partial Claim (2013 IPC Activity #5). Funds for contractor support were adjudicated in 2014, and the Department has committed considerable staff resources in coordination with co-Trustees for contract document development and refinement, logistics planning, and planning for the use of data generated by this study in avian injury quantification models. In 2015, the Department, in conjunction with the co-Trustees, will implement field data collection activities. Field data collection will be conducted during the same time of year (May through September) that active wildlife recovery operations were conducted in 2010 as part of the Oil Spill. Activities conducted in 2015 will also include the verification and validation of data collected as part of this effort. Data generated in this effort will be analyzed as part of Activity #2 (described below) and will support injury estimation using the BBM.

16. Background Oiling Rate

In 2013, the Department, in coordination with co-Trustees, requested adjudication from the NPFC for an assessment plan entitled *Background Oiling Rate for Live Birds*. This assessment activity was included in the Department's Second Interim Partial Claim (2013 IPC Activity #7). Funds for contractor support were received in 2014. The Department has committed considerable staff resources in coordination with co-Trustees in revising study plans,

developing and refining the contract document, logistics planning, and planning for use of data generated by this study in avian injury quantification models.

Collection of field data will begin in 2015. Data generated in this effort will be analyzed as part of Activity #3 (described below) and will increase the scientific defensibility of the avian injury estimate we will generate using the LOBM.

17. Avian Data Management

In 2015, the Department will continue to work with co-Trustees to finalize numerous reports on the avian assessment activities described above as we jointly interpret them for use in the development of our avian injury quantification models. These reports describe the avian injury data produced through the previously funded (both by BPXP and by the NPFC) assessment activities. Data generated under multiple avian injury studies are undergoing verification and validation, and quality assurance and control procedures, in coordination with co-Trustees and BPXP. These processes prepare the data for inclusion in the Department's database which continues to be expanded and refined to provide access to finalized data by the Department and our co-Trustees. These finalized data will be the foundation of the final injury assessment reports on which the comprehensive avian injury will be based.

General History of RP Involvement

The Department is the Lead Agency Trustee for the avian injury assessment. Together with our co-Trustees, we have worked cooperatively with BPXP throughout the exposure and injury assessment phases. We have coordinated with BPXP or their designated representatives on a regular basis (typically weekly calls and/or meetings) during the design of each study and its implementation. BPXP representatives were also provided an opportunity to review and comment on most work plans and subsequent addenda. Work plans were often revised to address comments provided by BPXP. BPXP representatives also participated in field data collection effort for most of the cooperative studies. Data from cooperatively funded plans were shared with BPXP as soon as practicable (usually at the end of each day of field data collection). The Department also agreed to provide BPXP with the data from non-cooperative plans upon completion of the studies. The Trustees are also working cooperatively with BPXP in the verification and validation of data from cooperative studies. As agreed upon with BPXP, the interpretation of data and the production of the Trustee-internal interpretive reports will be conducted independently of BPXP. Accordingly, data evaluation plans may not have been shared with BPXP.

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Administrative Record

Department staff will continue to respond to requests for documents to complete the administrative record. This activity will include providing new documents, data related to fieldwork and/or analyses, and preparation of the draft bird chapter of the DARP. The costs of the DOI team in gathering and providing these records for Administrative Record purposes is captured here. The costs of capturing and processing these records for Administrative Record purposes is captured under the Administrative Record Tasks, Activity #16 in the Claim.

Level of Effort

These activities will be completed by DOI employees identified below, for a total cost of \$2,000,000, with an associated contingency cost of \$300,000. Contractor support costs will be identified in each section below.

3.1. 2015 IPC #1: Avian Injury Quantification

Purpose of Activity and Injury Assessment Need

The Department requires funds for activities related to avian injury quantification for the DWH NRDA. Funds previously provided for Avian Injury Quantification Technical Support have been used to compile, review, and integrate large data sets of various formats, as well as to develop preliminary avian injury quantification models, develop draft reports, and support coordination with co-Trustees. Although substantial progress has been made toward completion of the BBM and Live Oiled Bird Model (LOBM), it is apparent that the Department underestimated the amount of technical support necessary to analyze and use the volume of bird data collected (dead bird collections, oiling rate surveys, colony counts, etc.) and the complexity of accurately quantifying the injury to birds resulting from a spill of this magnitude.

Methods

To quantify avian injury resulting from the Oil Spill, the Department is primarily relying on contracted technical assistance to develop the BBM and the LOBM.

Beached Bird Model

The Department will use the BBM to estimate the total number of birds that died from the onset of the spill through September 30, 2010, the date the Trustees terminated the NRDA Beached Bird Surveys. The BBM requires a number of types of input data: 1) the numbers of dead or impaired birds recovered during searches, 2) documented search effort associated with the search and recovery of birds and bird carcasses, 3) the

probability that birds that died on the water would be deposited on a shoreline, 4) the persistence of birds on shorelines, and 5) the ability of search crews to locate and recover birds. Input data for the BBM were, or will be, generated under at least seven NRDA work plans (see “Relationship to Other Activities and Data” below for a list of plans). This IPC does not seek funds to implement any of these seven work plans.

Live Oiled Bird Model

The LOBM will be used to estimate oil spill-related decreases in survival and the spill’s effects on reproductive success occurring primarily after September 30, 2010. The LOBM incorporates factors such as: 1) the numbers of birds occurring in areas affected by the oil spill (Abundance), 2) the incidence and degree to which birds were oiled (Oiling Rate), and 3) the fate of oiled birds (i.e., the likelihood a bird would die or suffer other adverse effects due to oil) (Fate). Input data for the LOBM has been, or will be, generated under at least 14 work plans and their addenda (see “Relationship to Other Activities and Data” below for a list of plans). This IPC does not seek funds to implement any of these 14 work plans.

Throughout the time period of the spill (well beyond the capping of the well), birds were observed with varying degrees of oil on their feathers. Most of these birds were not sufficiently incapacitated to enable capture by oil spill responders. NRDA surveys continued to observe externally oiled birds through April 2011, at which point the surveys were discontinued. Exposure to oil causes a variety of sub-lethal effects in birds, such as reduced buoyancy, reduced thermoregulatory ability, reduced ability to fly, starvation, anemia, and adverse physiological and pathological effects. These initial “sub-lethal effects” may turn lethal by reducing long-term survival and reducing reproductive success of birds.

The products of the BBM and LOBM are principal components of the Trustees’ avian injury quantification and will be used to identify and scale appropriate restoration alternatives. Preliminary test-runs of the BBM have been performed using non-validated data, but cooperative verification and validation of all data used in the BBM are ongoing and nearing completion. Following completion of data validation, BBM input parameter values will require rigorous sensitivity and uncertainty analyses (see item #3 below) prior to the final run of the BBM which will be used for final Trustee avian injury quantification. Similarly, the initial components of the LOBM have been compiled using data that are undergoing verification and validation. The LOBM has not been run in total because the Fate parameter estimates are dependent on the ongoing avian toxicology assessments which are not yet completed.

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Work Accomplished to Date

The Department, on behalf of the Trustees, has enlisted contractual support for development of the spill-specific BBM and LOBM, and production of associated reports and supporting materials. Development of these models and implementation of studies to generate input data for the models have required considerable time and effort from the Department and our co-Trustees over the past four years. Development of the models also represents a justifiable investment of funds from BP and the NPFC. Activities accomplished to date and examples of unanticipated increases of work effort are outlined below.

1) Spill-specific BBM Development

a. Data Compilation, Interpretation, and Formatting

In late 2012, the Department was granted access to the Unified Area Command's expansive digital archive of records compiled by the USCG. This massive archive provided an additional source of information to further refine bird search and recovery data for use in the BBM. Additionally, recognizing the tremendous volume of non-NRDA data that would require evaluation, the Department developed a work plan for the review and compilation of data generated by non-NRDA personnel (*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)). Under this plan, the contractor dedicated substantial effort to obtaining copies of data, searching and organizing large volumes of data in a variety of formats (e.g., hard-copy datasheets, electronic spreadsheets, Global Positioning System electronic files, digital photographs, etc.), and interviewing non-NRDA personnel to obtain requisite details about their wildlife search and recovery efforts.

As of September 2014, all BBM data have been compiled and formatted. These datasets are currently undergoing the Department's third party cooperative verification and validation process, and the Contractor is contributing to that process. Third party cooperative verification and validation as well as this Contractor's contribution to that process are both performed under a different source of funding.

b. Model Design and Construction

The preliminary design and construction of the BBM was completed in August 2013; the Department's original forecast for completion was approximately February 2013. The delay was primarily driven by the additional effort needed to compile, interpret,

and format BBM input data (including non-NRDA data). The preliminary BBM was designed using data which had not yet undergone third party verification and validation. As of December 2014, the contractor has continued to refine the design of the BBM, using information learned from the input data verification and validation process, as well as feedback from co-Trustees on the model assumptions and application. This refinement will ensure a more accurate and scientifically defensible quantification of avian injury. Future work (described below) will include sensitivity and uncertainty analyses; the results of which will provide guidance on additional refinements of the model or its inputs/assumptions.

c. Documentation

The contractor produced a preliminary draft of the BBM report (which was based on the preliminary draft BBM results) in August 2013 for Department review. The Department had originally anticipated a draft report being submitted in May 2013 but the short delay was primarily due to the additional data preparation work mentioned above. This initial draft report required an intensive all-Trustee review and revision process whereby the Department incorporated a number of the co-Trustee comments and edits that will improve the accuracy and scientific validity of the Trustee's avian injury quantification. As of December 2014, the contractor awaits completion of dataset verification and validation before completing model refinement and producing the revised draft final document for final Trustee review.

2) Spill-specific LOBM Development

a. Data Compilation, Interpretation, and Formatting

As with the BBM, the Department's original estimate for completing the compilation and formatting of the data generated by multiple NRDA studies supporting the LOBM was August 2012. The contractor completed compiling and formatting most LOBM-related datasets pertaining to the Abundance and Oiling Rate components by January 2014. All Abundance and Oiling Rate datasets are in the process of undergoing the necessary third-party verification and validation. Datasets pertaining to the Fate component are being compiled and validated by another team (under Avian Toxicity Study funding) and will be provided to the contractor for use in the LOBM.

b. Model Design and Construction

As with the BBM, the Department's original estimate for completing LOBM model runs was February 2013. A partial, preliminary construction of the LOBM was

completed February 2014. The LOBM thus far is incomplete because the Fate component is dependent on results from the yet completed Avian Toxicity studies. Once the Fate data are finalized, the Department and the contractor will finalize all components of the LOBM and produce accurate estimates of injured birds. As of December 2014, the contractor is awaiting verified and validated data for the Fate component of the LOBM.

c. Documentation

The contractor produced the first preliminary draft report on the partial LOBM (i.e., lacking the Fate component and LOBM results) for Department internal review and comment in April 2014. Following incorporation of staff comments, the contractor produced a revised partial report, for co-Trustees. As of December 2014, the contractor is addressing co-Trustee comments into this draft partial report.

The Department is seeking funding for the finalization of some activities, as well as the continuation or initialization of other activities, as described below.

1) Refinement of BBM Structure, Assumptions, and Input Parameters

The contractor will continue to coordinate with representatives from multiple state and federal agencies to refine the structure of the BBM and evaluate and refine assumptions and input parameters used in the BBM. This activity will include the continued evaluation of regional- or site-specific factors or conditions that affect the model output thus increasing the model's accuracy and scientific validity. This refinement is directly related to the results of the sensitivity and uncertainty analyses (see item #3 below), completion of the data validation process, and co-Trustee coordination in 2015.

2) Integration of Validated Data into the BBM

The Department, on behalf of the Trustees, is currently engaged in third-party verification and validation of the site- and spill-specific data generated by the BBM-related NRDA work plans. This data verification and validation process is being conducted cooperatively with BPXP and co-Trustees. The Department anticipates completion of this process in 2015. Once complete, the contractor will ensure that the validated datasets are utilized in the final BBM.

3) Characterization of Sensitivity and Uncertainty of BBM Assumptions and Input Parameters

The BBM is a specialized environmental model. Assessment of model input parameter sensitivities and uncertainties is a common (and necessary) practice in most all forms of environmental modeling and the BBM is no different. This sensitivities analysis of the BBM is necessary to improve the quality of model input measurements, to enhance the understanding of the model and its capabilities, and to better inform decision-makers that will be using the results of the model to quantify avian injury. This process is also used to generate probable ranges of model outcomes and confidence intervals within the range. Thus, the Department is requiring our BBM contractor to evaluate sensitivities and uncertainties in assumptions and input parameters used in the BBM. Results will be used to increase the reliability and accuracy of the BBM and thus the scientific defensibility of the Trustee's avian injury claim. This important effort is expected to take several months of dedicated effort, as the BBM for this unprecedented NRDA is complex. Although this activity was not explicitly envisioned (or budgeted for) in previous funding requests, its necessity has become clear during model development and co-Trustee coordination. This evaluation is now recognized to be essential to the scientific validity and defensibility of our avian injury quantification.

4) Finalization of BBM Analysis

Using validated data (item #2 above) and the results of the sensitivity and uncertainty analyses (item #3 above), the BBM will be finalized. This will ultimately yield a final quantification of avian mortality for the time period between the start of the spill through September 30, 2010.

5) Revision of BBM Reports and Supporting Documents

Following finalization of the BBM, the contractor will revise the draft BBM report and supporting documents to incorporate changes resulting from items #1-4. A significant addition to the report will be the explanation of the sensitivity and uncertainty analyses to describe how we assessed parameter sensitivity and uncertainties to improve the model input measurements. The revised draft will undergo at least two rounds of collaborative review and comment by DOI and co-Trustees, and revised accordingly. It is the Department's goal to finalize the BBM report in 2015.

6) Refinement of the LOBM

The contractor will continue to coordinate with representatives from multiple state and federal agencies with intimate knowledge of various bird abundance and oiling rate data to refine those important inputs to the LOBM and to strengthen the scientific validity of its output. Refinement of the model includes the continued evaluation of regional- or site-specific factors or conditions that affect the model outcomes, considering the guidance obtained from the LOBM sensitivity and uncertainty analyses (see item #9 below), results of the data validation process, and co-Trustee feedback. Refinement and completion of the LOBM is dependent upon completion of the Fate component of the model. The final dataset required for the Fate component of the LOBM is in turn dependent on the completion of the avian toxicity studies. When the studies are completed, the contractor will integrate the Fate component into the LOBM in coordination with experts conducting the avian toxicity studies (#7 below).

7) Coordination with Avian Toxicity Experts

Close coordination between the LOBM contractor and the experts conducting the avian toxicity studies is essential to completing the Fate component of the LOBM, and therefore essential to a LOBM that will accurately calculate the avian mortality. This activity was not explicitly envisioned (or budgeted for) in previous funding requests; however, the Department is better informed after two years of avian toxicity studies. Accurate output from the LOBM is predicated on close coordination between the experts conducting the avian toxicity studies and the contractor constructing and running the LOBM.

8) Integration of Validated Data into the LOBM

The Department, on behalf of the Trustees, is engaged in third party verification and validation of the site- and spill-specific data generated by 14 NRDA studies supporting the LOBM. This data verification and validation process is being conducted cooperatively with BPXP and co-Trustees. Once complete, the contractor will ensure that the validated datasets are utilized in the final LOBM.

9) Characterization of Sensitivity and Uncertainty of LOBM Assumptions and Input Parameters

As previously noted, assessing sensitivity and uncertainties is necessary to better quantify and to improve the quality of model input measurements, to enhance the understanding of the model and its capabilities, and to better inform decision-makers using the results of the model. Thus, similar to the BBM, the contractor will evaluate

sensitivity and uncertainties in assumptions and input parameters used in the LOBM. The results will be used to identify elements of the model structure or model assumptions and/or inputs that may require additional attention, such as evaluating means to reduce uncertainty and increase the reliability and accuracy of the model. Although this activity was not explicitly envisioned (or budgeted for) in previous funding requests, its necessity has become clear during model development and co-Trustee coordination. This evaluation is now recognized as essential to the scientific validity and defensibility of our avian injury quantification.

10) Finalization of LOBM Analysis

Using validated data and the results of the sensitivity and uncertainty analyses, the contractor will finalize the LOBM and generate estimated injuries (death and other adverse impacts) to birds that occurred as a result of the Oil Spill after September 30, 2010.

11) Revision of LOBM Reports and Supporting Documents

The contractor will revise the draft LOBM report and supporting documents to incorporate the Fate component into the model incorporate changes resulting from items #6-10, and report LOBM results. The revised draft will undergo at least two rounds of review and comment by Department and co-Trustee staff, and subsequent revision prior to finalization.

12) Trustee Coordination

Coordination is important to finalizing both the BBM and the LOBM on behalf of the Trustees. The contractor will participate in conference calls, web conferences, and/or in-person meetings, as requested by the Department, to discuss and explain model development progress, final model design, and report content.

13) Coordination in the Development of the Comprehensive Quantification of Avian Injury

As requested by the Department, the contractor will assist the Department in assembling a comprehensive quantification of avian injury that will inform the final DARP for the DWH NRDA.

Relationship to Other Activities and Data

The BBM and LOBM synthesize avian injury data collected largely from the pre-assessment and assessment studies listed below.

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For the Beached Bird Model:

- Work Plan for Estimating Mortality of Birds Using Beached Bird Surveys in the Gulf of Mexico Near the Mississippi Canyon 252 Oil Spill (Bird Study #1)
- Work Plan for Estimating Mortality of Birds Using Beached Bird Surveys in Louisiana for the Mississippi Canyon 252 Oil Spill (Bird Study #1A-LA)
- Work Plan: Detection Probability (Searcher Efficiency) (Study 1B) October 12, 2010
- Work Plan (Bird Study #1C): Beached Carcass Persistence Study
- Using Radio Telemetry to Determine the Fates of Bird Carcasses Drifting in the Northern Gulf of Mexico (Bird Study #1D)
- 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)
- Assessment Plan: Background Deposition of Bird Carcasses on Walkable Beaches and in Marshes (Bird Study #24)

For the Live Oiled Bird Model:

- Work Plan for Aerial Surveys and Photographic Census for Birds in the Vicinity of the Deepwater Horizon (MSC 252) Oil Spill - Bird Study #2, and subsequent amendments to add additional years beyond 2010
- Analysis of Colony Photographic Census Data collected under the Work Plan for Aerial Surveys and Photographic Census for Birds in the Vicinity of the Deepwater Horizon (MC252) Oil Spill (Bird Study #2), as amended
- Work Plan for Estimating Oiling and Mortality of Breeding Colonial Waterbirds from the Deepwater Horizon (MC252) Oil Spill (Bird Study #4), and subsequent amendments
- Work Plan for Estimating Shorebird Oiling Mortality Deepwater Horizon (Mississippi Canyon 252) Oil Spill Bird Study #5, and subsequent amendments
- Work Plan For Estimating Oiling Rates Among Pelagic Birds Using Ship Based Surveys in the Vicinity of the Deepwater Horizon (MSC 252) Oil Spill (Bird Study #6)
- Natural Resource Damage Assessment Work Plan for Determining Injury to the Piping Plover (*Charadrius melodus*) from the Deepwater Horizon (MC252) Oil Spill Bird Study #7, as amended

- Time-Critical Assessment: Gulf Coast Breeding, Beach-Nesting Bird Populations in Areas Impacted by the Deepwater Horizon/Mississippi Canyon 252 Oil Spill Bird Study #8, as amended
- Work Plan for Estimating Wintering Waterfowl Oiling and Mortality Bird Study Plan #10
- Time-Critical Natural Resource Damage Assessment Feasibility Study: Estimating Carcass Detection in Priority Waterfowl Habitats Impacted by the Deepwater Horizon (Mississippi Canyon 252) Oil Spill (Bird Study #11)
- Work Plan for Determining Oiling Rates and Mortality of Wintering Open-Water Waterbirds from the Deepwater Horizon (Mississippi Canyon 252) Oil Spill (Bird Study 12)
- Natural Resource Damage Assessment Work Plan for Determining Physiological Injury to Oiled Birds from the Deepwater Horizon (MC252) Oil Spill (Bird Study #13)
- Addendum to the DWH NRDA Pre-Assessment Study "Work Plan for Determining Physiological Injury to Oiled Birds from the Deepwater Horizon (MC252) Oil Spill (Bird Study #13) - Corroboration of Blood Parameters
- Laboratory Avian Toxicity Studies to Determine the Effects of Deepwater Horizon/MC252 Oil Spill on Bird Viability (Bird Study #20)
- Assessment Plan to Determine the Background Oiling Rate for Live Birds (Bird Study #25)

Coordination and Implementation

This activity will provide for contractual support for technical assistance in avian injury quantification. This support includes extensive coordination between the Department and co-Trustees in the development and refinement of models and the revision and finalization of associated reports and supporting materials.

Deliverables Produced

These activities will produce:

- a finalized BBM,
- a final report (including appropriate report appendices) on BBM methods and results (i.e., estimate of avian adult mortality for the period of April-September 2010),
- a finalized LOBM, and
- a final report (including appropriate report appendices) on LOBM methods and results (i.e., estimate of avian mortality for the period after September 30, 2010.)

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Principal Investigators

Department staff involved in this activity includes Paige Martin, Erin Chandler, Kate Healy, Pete Tuttle, Jon Hemming, Veronica Varela, Ashley Mills, Kevin Reynolds, Clare Cragan, and Debora McClain. The Department contracted with RG Ford Consulting, Inc. for the development of the BBM and LOBM.

RP Involvement

The RP was provided the opportunity to cooperate in, and actively engaged in most of the design and implementation of the field studies that derived much of the spill-specific data that have since been translated into specific inputs for the BBM and LOBM. The RP and Trustees are currently participating in the cooperative verification and validation of these data. It has been a long-standing agreement among BPXP and the Trustees that the interpretation of data and the production of the Trustee-internal interpretive reports (and the production of the BPXP-internal reports) will be conducted independently. Accordingly, the Trustees do not anticipate extensive coordination with BPXP in 2015 regarding data analysis or report finalization pertaining to avian injury quantification.

Level of Effort

Total estimated contract costs for this activity are \$1,510,428 with an associated contingency of \$226,564.

3.2. 2015 IPC #2: Estimation of 2010 Background Carcass Deposition (Bird Study #27)

Purpose of Activity and Injury Assessment Need

The Trustees, under the leadership of the Department, will use data on birds collected dead or incapacitated during the time of the Oil Spill to estimate a portion of the avian mortality associated with the Oil Spill. As described above, the BBM is the principal tool used to quantify injury from collected birds and the Trustees' goal is to construct the most accurate and scientifically defensible BBM possible. To accomplish this, the Trustees must exclude birds that may have died or become incapacitated due to causes other than the Oil Spill and the most accurate way to calculate this is by collecting "background carcass deposition" data from within the affected spill area at the same time of year the Oil Spill occurred (i.e., the rate at which bird carcasses or incapacitated birds would have been encountered on shorelines had the Oil Spill not occurred). This IPC activity includes the analyses and interpretation of various sources of data relevant to background carcass deposition in the northern Gulf of Mexico.

This activity is separate from the Bird Study #24: Background Deposition of Bird Carcasses on Walkable Beaches and in Marshes previously funded by the NPFC and is necessary because: a) the funding requested and received for Bird Study #24 only covered implementation of that field study and does not include data interpretation, and b) the data sources that need to be interpreted in order to generate a background deposition rate include data from Bird Study #24 as well as two other independent studies implemented by the State of Louisiana.

Methods

This IPC activity involves data interpretation, development of background carcass deposition rate information relevant to the BBM, report preparation, coordination with Trustees and others as appropriate, and revision and finalization of reports that address Trustee comments. The data interpretation will involve working with at least three datasets providing information on carcass deposition in the northern Gulf of Mexico:

1. a background carcass deposition study initiated by the State of Louisiana in July-August 2013;
2. a background carcass deposition study initiated by the State of Louisiana in July and August 2014; and
3. Bird Study #24, the Trustee's comprehensive study of background carcass deposition.

Additional data sources will be considered if any other relevant sources are discovered to exist. The transformation of these field data into a background deposition rate applicable to 2010 uses a process very similar to a BBM, in that the number of birds collected during the studies must be adjusted for searcher efficiency, carcass persistence, and search effort. This IPC activity will produce estimates of background deposition in three separate years which will allow an evaluation of year-to-year variation in the geographical areas where the three studies overlap. This will strengthen our background deposition data set and thus our BBM output overall. This activity will also include an evaluation of the applicability of the background deposition rate developed under this IPC activity to the year 2010.

Relationship to Other Activities and Data

The Department included a request for funds to conduct a background carcass deposition study in its 2013 IPC (Background Deposition of Bird Carcasses on Walkable Beaches and in Marshes (Bird Study #24)). Funding was provided by the NPFC in late May 2014 after BPXP declined to participate or provide funding. The Department will implement the field study in 2015. Complementary to this Department study, the State of Louisiana conducted smaller scale background carcass deposition studies exclusively in Louisiana in 2013 and

2014. The funding received for implementation of Bird Study #24 included funds to compile the raw data, work with the Department's Data Verification and Validation Contractor, and prepare an End-of-Study Report after the conclusion of the field work. The End-of-Study Report describes the implementation of the study, any deviations from the study plan or standard operating procedures, and some preliminary summary statistics. It is the standard practice of the Department that End-of-Study Reports do not contain data interpretation, and therefore, funding is necessary to translate the data generated by Bird Study #24 and the two Louisiana efforts into information applicable to the background carcass deposition rate for the northern Gulf of Mexico during the period April – September 2010. The Department will use the results of this IPC activity to adjust the results of the BBM (constructed for the time period from the start of the Oil Spill through September 30, 2010) in order to isolate the BBM avian mortality attributable to the Oil Spill rather than other causes.

Coordination and Implementation

To achieve this IPC activity, the Department will obtain the services of a contractor. The contractor will work with the Department and co-Trustees (and specifically, the State of Louisiana regarding the 2013 and 2014 Louisiana data collection efforts) and the principal investigator for Bird Study #24. The Department and the State of Louisiana are currently working together to verify and validate the 2013 Louisiana data (supported by funding not associated with this IPC activity). The Department and co-Trustees will continue to work together to validate other datasets as necessary, so that validated datasets are available to the contractor to implement this IPC activity. The contractor will coordinate with the BBM contractor, to ensure the product of this IPC activity can be utilized in conjunction with the BBM results. Materials produced as contract deliverables under the IPC activity will be reviewed by the Department and co-Trustees.

Deliverables Produced

This IPC activity will ultimately produce a background carcass deposition rate and a report explaining the methodology used in developing that rate.

Principal Investigators

The Department will obtain contracted technical assistance to implement this IPC activity, and thus, the specific contractor is yet to be determined. The Department staff involved in this activity include Paige Martin, Erin Chandler, Pete Tuttle, Jon Hemming, Veronica Varela, Kevin Reynolds, Clare Cragan, and Debora McClain.

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RP Involvement

The Department invited BPXP to participate in Bird Study #24 (Background Deposition of Bird Carcasses on Walkable Beaches and in Marshes), but BPXP declined to participate and declined to fund the Department's implementation of the study. BPXP has not been involved in the field studies implemented by the State of Louisiana that will provide supplemental background deposition information within the state of Louisiana for 2013 and 2014. It has been a long-standing agreement among BPXP and the Trustees that the interpretation of data and the production of the Trustee-internal interpretive reports will be conducted independently. This proposed activity requests funding largely for data evaluation and interpretation. However, if BPXP agrees to participate in this IPC activity as a cooperative partner and provides funding for the activity's implementation, the Department would be open to cooperatively developing a background carcass deposition rate.

Level of Effort

Total estimated contract costs for this activity are \$129,644 with an associated contingency of \$19,447.

3.3. 2015 IPC #3: Data Analysis for Background Oiling Rate for Live Birds

Purpose of Activity and Injury Assessment Need

The Trustees, under the leadership of the Department, will use data on live oiled birds collected during the time of the Oil Spill to estimate a portion of the avian mortality associated with the Oil Spill. A LOBM is one tool being used for avian injury quantification and the Trustees want to ensure this model is sound and scientifically defensible. The Department acknowledges that there are many oil wells in the northern Gulf of Mexico and there is a possibility that not every oiled bird observed in 2010 and 2011 was oiled from the Oil Spill. To account for birds that may have been oiled by oil from a different source, the Trustees are collecting data on "background oiling rate" in the northern Gulf of Mexico (i.e., the oiling rate of birds if the Oil Spill had not occurred).

The Department included a request for funds to conduct a background oiling rate study in its 2013 IPC (Bird Study #25: Background Oiling Rate for Live Birds). Funding was provided by the NPFC in July 2014 after BPXP declined to participate or to provide funding. The Department is currently working on implementation of this study. The funding received for implementation of Bird Study #25 included funds to compile the raw data, work with the Department's Data Verification and Validation Contractor, and prepare an End-of-Study Report after the conclusion of the field work. The End-of-Study Report will describe the implementation of the study, any deviations from the study plan or standard

operating procedures, and some preliminary summary statistics. It is the standard practice of the Department that End-of-Study Reports do not contain data interpretation, and therefore, funding is necessary to translate the data generated by Bird Study #25 into information applicable to the background oiling rate for the northern Gulf of Mexico. Funding for data analysis and interpretation was not included in the Bird Study #25 funding request.

Methods

The Department will obtain contracted technical assistance to perform the data analysis and interpretation that is the focus of this IPC activity. The contractor will use data generated by Bird Study #25 and other relevant data to develop a background oiling rate for live birds in the northern Gulf of Mexico. This IPC activity involves data interpretation, development of background oiling rate information relevant to the LOBM, report preparation, coordination with Trustees and others as appropriate, and revision and finalization of reports that address Trustee comments.

Relationship to Other Activities and Data

The contractor will use data generated by Bird Study #25 and other relevant data to develop a background oiling rate for live birds in the northern Gulf of Mexico. The background oiling rate will be used to adjust the LOBM results, as appropriate, to account for birds that may have been oiled with oil from sources other than the Mississippi Canyon 252 Macondo well.

Coordination and Implementation

The Department plans to obtain the services of a contractor to complete this IPC activity. The contractor will work with the Department and co-Trustees and the principal investigator for Bird Study #25 (yet to be identified). The Department and co-Trustees will continue to work together to validate datasets, so that validated datasets are available to the contractor to implement this IPC activity. The contractor will coordinate with the LOBM contractor and Department staff, to ensure the product of this IPC activity is compatible with and able to be incorporated into the LOBM.

Deliverables Produced

This IPC activity will ultimately produce a background oiling rate on live birds in the northern Gulf of Mexico and a report explaining the methodology used in developing that rate.

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Principal Investigators

This proposed activity will require contracting with appropriate experts for data analysis and interpretation. The entity providing this technical assistance has not yet been identified. The expert(s) will be selected following a review of qualifications. Department staff involved in this activity include Paige Martin, Erin Chandler, Pete Tuttle, Kate Healy, Jon Hemming, Veronica Varela, Kevin Reynolds, Clare Cragan, and Debora McClain.

RP Involvement

The Department invited BPXP to participate in Bird Study #25 (Background Oiling Rate for Live Birds), but BPXP declined to participate and declined to provide funding to the Department for study implementation. BPXP and the Trustees agreed that the interpretation of data and the production of the Trustee-internal interpretive reports will be conducted independently. This proposed activity requests funding for data interpretation and the production of reports. Should BPXP agree to participate in this activity as a cooperative partner and provide funding for the activity's implementation, the Department would be open to cooperatively developing a background oiling rate.

Level of Effort

Total estimated contract costs for this activity are \$129,644 with an associated contingency of \$19,447.

3.4. 2015 IPC #4: Integration of Migratory Bird Exposure and Injury Assessment

Purpose of Activity and Injury Assessment Need

The Department must integrate the findings of all avian exposure and pathway, pre-assessment, and injury assessment activities performed as part of the DWH NRDA into a comprehensive discussion regarding the effects of the Oil Spill on birds and their supporting habitat. This effort will produce a single, comprehensive interpretive avian injury report synthesizing data and findings for all of the migratory bird assessments performed by the Trustees. This activity will also consider, and integrate as appropriate, available data that are relevant to avian injuries resulting from the Oil Spill but generated outside of the NRDA process by Trustee agencies or any other investigative entity. Integration of information will inform the Trustees' determination of appropriate restoration projects to compensate for injuries to migratory birds and their supporting habitats. The single synthesis report will ultimately facilitate the Department's preparation of the DARP.

Methods

The Department will employ the services of a technical expert in oil spill avian injury assessment to prepare the synthesis report on avian injury. In 2014, the Department screened potential candidates for performing this work and ultimately decided to use a research wildlife biologist from the Department's U.S. Geological Survey, Alaska Science Center, to perform the work. However, the Department has determined that contractor assistance is required specifically to support the efforts of this Avian Injury Integrator and the Department to complete the synthesis of the findings from the dozens of migratory bird Pre-Assessment and Assessment Plans, associated interpretive study reports, and supporting materials into a unified, comprehensive avian injury assessment report. The report will address exposure, pathway, causation, and spill-related harm. The report will integrate the various components of the Trustees' injury assessment activities, such as the findings of the BBM, LOBM, estimates of lost avian productivity in 2010 and subsequent years, and habitat-related effects to bird survival and reproduction. Preparation of the synthesis report will require care to be taken to avoid double counting of resource injuries that may result from the application of multiple avian injury models and injury quantification activities. This effort will also consider the findings of injury assessment efforts for other (non-avian) resource groups, as birds are a part of the Gulf of Mexico ecosystem and adverse impacts to other parts of the ecosystem can affect birds as well.

Relationship to Other Activities and Data

This effort is intended to provide a comprehensive accounting of avian injuries, as identified via the DWH NRDA. Accordingly, the findings of all avian assessment activities will be considered in the preparation of this avian injury report. This effort will consider the findings of injury assessment efforts for spill related injury to other natural resource components that also adversely affect bird survival and reproduction.

Coordination and Implementation

In order to prepare the avian injury synthesis report, the Avian Injury Integrator will require information from many NRDA studies, within and outside of the avian resource group. Due to the complexity and volume of injury information to be synthesized, contractor assistance is required to facilitate the flow of information among the Integrator and the various teams and co-Trustees working on specific aspects of the NRDA.

Principal Investigators

The contractor has not yet been selected. Department staff involved in this activity are Daniel Esler, Veronica Varela, Jon Hemming, Pete Tuttle, Kate Healy, Paige Martin, Erin Chandler, Charles Wood, Kevin Reynolds, Clare Cragan, and Debora McClain.

RP Involvement

BPXP will not be involved in the generation of the synthesis avian injury report. This IPC activity is largely focused on the interpretation of data. The Trustees and RP have long agreed that the interpretation of data would be conducted independently by each party.

Level of Effort

Total estimated contract costs for this activity are \$299,920 with an associated contingency of \$44,988.

3.5. 2015 IPC #5: Injury to Birds Resulting from Habitat and Prey Exposure to the Deepwater Horizon/ Mississippi Canyon (MC 252) Oil Spill Analysis

Purpose of Activity and Injury Assessment Need

In addition to the adverse effects caused by direct oil exposure, birds are also adversely affected when their supporting habitats such as coastal marshes, the water column, sandy shorelines, mangroves and *Sargassum* mats are oiled. Oiling of these supporting habitats results in a loss of forage resources (diminished prey or bird displacement), or diminished habitat quality for nesting, loafing, and other activities. Similar losses and other disturbances can also result from oil cleanup activities. Any adverse habitat impacts may cause reductions in avian reproductive success or survival.

The purpose of this avian injury activity is to evaluate and characterize the effects of oiled habitat and response activities on the associated bird communities. Mechanisms of injury to birds will be identified and resulting effects to the survival and reproductive success will be qualitatively assessed.

Methods

The Department will obtain contracted technical assistance to assist with the evaluation of indirect injury. The contractor's work under this IPC activity will involve the compilation and review of all available information on the life histories, habitat use, and ecological requirements (food resources, habitat requirements, etc.) of coastal bird species to identify birds at risk of habitat-related effects from the Oil Spill. Potentially affected habitats included in this evaluation are beach, marsh, mangrove, mudflat, *Sargassum*, open-water, and other habitats, as appropriate. Information on the effects of oil and associated response activities on habitat constituent elements (vegetation, habitat structure, food resources, etc.) generated by other DWH NRDA activities or from scientific literature will also be compiled and reviewed. Pertinent spill-related information will be compiled and reviewed to identify and

characterize mechanisms of injury resulting from injuries to avian habitat and prey. Spill-related information will include factors such as the extent and severity of oiling of specific habitat types, protective measures (e.g., oil boom deployment, bird hazing, etc.), and oil recovery activities (e.g., staging, skimming, removal of rack and *Sargassum*, sand sifting, human disturbance, etc.) undertaken. This collective information will be used to qualitatively assess injury to birds resulting from injuries to their habitat or food sources.

Relationship to Other Activities and Data

This effort is intended to provide a qualitative assessment of injuries to migratory birds that result from injuries to essential migratory bird habitat and prey. This assessment has not been addressed in any of the other injury assessment groups across this NRDA (e.g., marsh, sand beach, nearshore, etc.). For example, the marsh technical work group is focusing on quantifying injuries to marsh habitat as a result of the Oil Spill; however, this group has not addressed how the measured injuries to the marsh directly affect various migratory and resident bird species that use the marsh. In order to evaluate indirect injury to birds, this activity will draw upon the findings of all relevant NRDA studies, including avian studies, studies focusing on other natural resources, and available data generated outside of the DWH NRDA in order to evaluate indirect injury to birds. Information generated through this activity will enable a more comprehensive assessment of total injury to birds which will be incorporated into the Department's comprehensive avian injury report.

Coordination and Implementation

To achieve this IPC activity, the Department will obtain the services of a contractor. The contractor will work under the direction of the Department staff and with the co-Trustees.

Deliverables Produced

The ultimate product of this IPC activity will be a report that contains:

1. Review of available information on coastal associated bird species in the northern Gulf of Mexico, including information on the birds' life histories and their habitats known to be oiled or injured due to response activities (e.g., beach, marsh, mangrove, mudflat, *Sargassum*, and open-water habitats, plus others as appropriate).
2. Review of available information on the nature and distribution of oil from the Oil Spill in the above-listed habitats and identification of pathways (with supporting literature and conceptual models), for injuries to bird species (or guilds) in these habitats.
3. Detailed description of injuries to bird species (or guilds) resulting from documented injuries to habitat and prey.

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Principal Investigators

This IPC activity requires contracting with one or more experts for the evaluation and characterization of injury to migratory birds. The expert(s) will be selected following a review of qualifications. Department staff involved in this activity include Erin Chandler, Jon Hemming, Pete Tuttle, Kevin Reynolds, Clare Cragan, and Debora McClain.

RP Involvement

BPXP will not be involved in this activity as BPXP and the Trustees agreed that the interpretation of data and the production of the Trustee-internal interpretive reports will be conducted independently by each party.

Level of Effort

Total estimated contract costs for this activity are \$40,000 with an associated contingency of \$6,000.

3.6. 2015 IPC #6: Avian Toxicity Synthesis Report and Revised Oiled Bird Fate Matrix

Purpose of Activity and Injury Assessment Need

The Department has been the lead for several Oil Spill Avian Injury studies documenting the deleterious physical and physiological effects to birds exposed to the Oil Spill. The findings of these studies were evaluated under the assessment plans “*Work Plan for Determining the Physiological Injury to Oiled Birds from the Deepwater Horizon (MC 252) Oil Spill*” (and the addendum to that plan) and “*Laboratory Avian Toxicity Studies to Determine the Effects of Deepwater Horizon/MC252 Oil Spill on Bird Viability (Bird Study 20)*.” These studies have documented biochemical, physiological, and functional effects (e.g., impaired organ system function, impaired flight, etc.) in birds exposed to the Oil Spill. The results of these studies will be compiled into at least ten individual technical reports, many of which will be published either in part or in whole in peer reviewed scientific journals.

In addition to conducting the laboratory and field studies listed above, the Department assembled a panel of experts to review the available literature and evaluate the expected effect of oil on birds. Under the assessment plan “*Literature Based Fate Estimate of Birds Exposed to the Deepwater Horizon/ Mississippi Canyon (MC252) Oil Spill*,” the Department produced a draft Literature-Based Panel Summary Report, containing the Trustee’s “oiled bird fate matrix.” This matrix is the tool the Trustees’ use to estimate the fate (reduced survival and impaired reproduction) for northern Gulf of Mexico bird guilds and bird

species affected by the Oil Spill. The results of this matrix and all of the additional efforts described above are used to generate information for the fate input to the LOBM.

Since beginning the assessment, the Department has produced substantial information describing and documenting the deleterious effect of the Oil Spill on migratory birds. The purpose of this IPC activity is to synthesize the findings of the physiologic injury studies, avian toxicity studies, the Literature-Based Fate Estimate, other NRDA avian studies, and relevant literature into a single, comprehensive interpretive report detailing the toxicological, physiological, and functional adverse effects of birds exposed to oil from the Oil Spill. This synthesis report is a necessary component of the Trustees' comprehensive avian injury report that is required for the avian injury chapter within the Trustees' final DARP. This synthesis report also will be necessary to update the oiled bird fate matrix by incorporating all of the Trustees' recently generated avian toxicity data. Both of these activities (writing the synthesis report and updating the oiled bird fate matrix) are critical to determining the injury quantification fate component of the LOBM and thus the overall quantification of the bird injury.

Methods

The first component of this IPC activity is the generation of a comprehensive report synthesizing the results of the physiological injury studies, avian toxicity studies, the Literature-Based Fate Estimate, and other NRDA avian studies implemented for the DWH NRDA. The report will also discuss and interpret the results of the above listed studies within the context of the available published scientific literature. The Department will contract the services of an expert or experts to detail the effects of the Oil Spill on bird clinical pathology, avian migration and energetics, physiological ecology, and other disciplines. These expert(s) will be provided access to all avian reports and data generated as part of the DWH NRDA. The experts will also rely on relevant literature to further characterize the occurrence, nature, and severity of injury to all bird species and guilds impacted by the Oil Spill.

A second component of this activity will include incorporation of the information from the avian toxicity synthesis report into the literature-based oiled bird fate matrix. The expert panel originally based the oiled bird fate matrix on their professional expertise, published literature and other readily available information. At the time the panel generated the matrix, much of the data generated as part of the *Deepwater Horizon* Avian Toxicity Studies were still very preliminary or had not yet been generated. This proposed IPC activity will contract an expert(s) to: (1) review available information from the avian toxicity synthesis report and the various supporting technical reports, (2) review the literature-based oiled bird fate matrix and the summary report developed under the Literature-Based Fate Estimate Plan, and (3)

incorporate the findings of Avian Toxicity synthesis report into the oiled bird fate matrix. A narrative report will accompany the revised literature-based oiled bird fate matrix to document the rationale used during the revision of the matrix. The resulting comprehensive synthesis report and revised oiled bird fate matrix will determine the injury quantification fate component of the LOBM.

Relationship to Other Activities and Data

This IPC activity is the critical synthesis and integration of all data produced from all the avian toxicity-related study plans the Trustees have executed to date. The products of this IPC activity will be used within the LOBM to quantify avian injury as well as by the Department's Bird Integrator as he writes the comprehensive avian injury report.

Coordination and Implementation

This synthesis report and revised oiled bird fate matrix generated by this assessment activity are intended to inform fate component inputs for the LOBM. This information will assist the Department and co-Trustees with ongoing work to finalize the avian injury quantification and to draft the Trustees' avian injury report. All Trustees will have the opportunity to review the synthesis report and revised oiled bird fate matrix (and the accompanying narrative) prior to finalization.

Deliverables Produced

The deliverables of this IPC activity are 1) the synthesis report incorporating the findings of all *Deepwater Horizon* avian toxicity assessments, and 2) an assessment and update of the literature-based avian fate matrix using this summary report and additional underlying data and information.

Principal Investigators

As indicated above, the activity necessitates contracting with one or more experts for the synthesis and interpretation of the findings of multiple avian injury studies. The experts will be selected following a review of qualifications. Department staff involved in this activity include Kate Healy, Erin Chandler, Mike Hooper, Jon Hemming, Pete Tuttle, Ashley Mills, Veronica Varela, Kevin Reynolds, Clare Cragan, and Debora McClain.

RP Involvement

At this time, the Department expects the coordination with BPXP on this activity to be minimal. The Trustees and BPXP agreed that the interpretation of data and the production of each party's internal interpretive reports will be conducted independently.

Level of Effort

Total estimated contract costs for this activity are \$258,000 with an associated contingency of \$38,700.

3.7. 2015 IPC #7: Survivorship Analysis using Bird Telemetry Data

Purpose of Activity and Injury Assessment Need

As part of three cooperative pre-assessment studies (Estimating Secretive Marsh Bird Mortality, Deepwater Horizon (MSC 252) Oil Spill, Bird Study #3; Estimating Oiling and Mortality of Breeding Colonial Waterbirds from the Deepwater Horizon (MC 252) Oil Spill (Bird Study #4); and Estimating Shorebird Oiling and Mortality, Deepwater Horizon (MC 252) Oil Spill, Bird Study #5), the Trustees deployed satellite and radio transmitters to track the movement and determine fate of oiled birds in the Area of Potential Impact (API) and unoiled birds in selected reference areas. Satellite transmitters were deployed on brown pelicans, great egrets, and black skimmers. Radio transmitters were deployed on black skimmers, seaside sparrows, clapper rails, and American oystercatchers. Information on the exposure of the birds to oil and the effect of the oil on the birds was collected upon initial capture. Movement and fate data were compiled following transmitter deployment.

Initial examination of the data appear to indicate decreased survivability for some of the species captured and tagged in oiled areas compared to the same species captured and tagged in reference areas. The objective of this IPC activity is to quantify what appears to be differential survival between birds captured in oiled areas and birds captured in reference areas. Data generated through this effort will directly support the Fate component of the LOBM and thus aid the Department in quantifying the avian injury that occurred after September 30, 2010.

Methods

In 2014, the Department conducted a rudimentary analysis of previously collected telemetry data and relevant covariates (e.g. capture location oil exposure, oil effect, etc.). This initial investigation of the data elucidated the need for a more thorough analysis using a Cox Proportional Hazards Model (Cox Model). A Cox model is a well-accepted statistical technique used to explore the relationship between the survival of a bird and several explanatory variables. Examples of explanatory variables we will analyze include capture location, oiling category, and the fate of the bird, and this analysis will be used to quantify and explain the lower rate of survival we are observing in birds captured from oiled locations in 2010.

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Relationship to Other Activities and Data

This IPC activity will analyze data from three previously completed cooperative pre-assessment studies:

1. Estimating Secretive Marsh Bird Mortality, Deepwater Horizon (MSC 252) Oil Spill, Bird Study #3;
2. Estimating Oiling and Mortality of Breeding Colonial Waterbirds from the Deepwater Horizon (MC 252) Oil Spill (Bird Study #4); and
3. Estimating Shorebird Oiling and Mortality, Deepwater Horizon (MC 252) Oil Spill, Bird Study #5).

The results of this activity will directly support the Fate component of the LOBM and thus aid the Department in quantifying the avian injury that occurred after September 30, 2010.

Coordination and Implementation

This information will assist the Department and its co-Trustees with ongoing work to support and finalize the avian injury quantification. The selected contractor will work with the Department, co-Trustees, and principal investigators charged with completing the LOBM. Trustees will have the opportunity to review the survivorship report prior to finalization.

Deliverables Produced

The deliverable of this IPC activity will be an interpretive report describing the survivorship and movement patterns of birds that were tracked using satellite and radio tags as part of three pre-assessment studies. Data related to exposure to oil, effects of oil exposure, and other factors, as appropriate, will be discussed.

Principal Investigators

The contractor for this activity will be Western EcoSystem Solutions, Inc. Department staff involved in this activity include Erin Chandler, Jon Hemming, Veronica Varela, Pete Tuttle, Kevin Reynolds, Clare Cragan, and Debora McClain

RP Involvement

It is not anticipated that BPXP will be involved in this activity as BPXP and the Trustees agreed that the interpretation and analysis of data and the production of internal interpretive reports will be conducted independently.

Level of Effort

Total estimated contract costs for this activity are \$78,260 with an associated contingency of \$11,739.

4. Endangered/ Threatened Species

4.1. 2015 IPC #8 Injury Assessment and Restoration Planning for Endangered/ Threatened Sea Turtles

Purpose of Activity and Injury Assessment Need

The Department and NOAA are jointly leading the sea turtle injury assessment on behalf of the Trustees. On a broad scale, the Department's sea turtle assessment focuses specifically on nesting conditions, hatchling and egg life stages, and nesting females for Kemp's ridley and loggerhead sea turtles. NOAA's sea turtle assessment focuses on offshore juvenile (oceanic) and adult (neritic) sea turtles and includes leatherback, hawksbill, and green sea turtle species as well as Kemp's ridley and loggerhead species. Under this IPC activity, the Department will continue to integrate and summarize data and findings from ongoing efforts to document exposure and injury to sea turtles from the Oil Spill. Data and analysis from the nesting sea turtle studies will be incorporated into the Sea Turtle Exposure and Injury Assessment Report, as described in NOAA's Third Interim Partial Claim. The end product of this integration effort will be the production of a Trustee sea turtle interpretive report which will summarize data and findings for sea turtles injured by the Oil Spill.

The Department has led many exposure and injury assessments of nesting sea turtles and nests, some of which are ongoing. For example, loggerhead nest counts at index beaches on the Florida panhandle have been statistically compared to nest counts at reference beaches using a before-after-control-impact statistical model. This study showed statistical evidence of decreased loggerhead nests in 2010 at the height of the response and clean up activity. These results are supported by the Department's work identifying spatial and temporal overlaps between the 2010 Panhandle loggerhead nesting and both shoreline oiling and response activities. Additionally, the Department has led the analysis of the nest translocation response efforts to determine how many turtles, including hatchlings, were injured as a result of the Oil Spill.

Work within the loggerhead and Kemp's ridley sea turtle nesting plans has generated valuable information on the number of females that nest in the northern Gulf of Mexico in the area of the spill. These plans also provided robust data on where the females reside and forage before nesting, after nesting, and between nesting intervals within the breeding

season. These data are relevant not only in helping identify the extent of possible exposure and injury caused by the Oil Spill but also in allowing for better identification and/or review of restoration planning options specific to this subpopulation.

In the past four years, the Department has also undertaken extensive evaluations of other biologically important endpoints, such as Kemp's ridley clutch size/hatching success/emergence success (2008-2013), embryonic deformities (2008-2013), and sex ratios (2010-2012). The Department has also initiated genetic analysis of Kemp's ridley nesting females and nests (2010-2012) to facilitate linking nests to specific known and unknown females. Blood samples from nesting females have been collected (Kemp's ridley in 2011 and 2012; loggerheads in 2012) and these have been subject to clinical chemistry, hematological and immune function analysis. For most of these efforts, data generation (including sample analysis) is complete or nearing completion; however, other tasks such as data validation/verification, documentation of the studies' methods and results, and interpretation and integration, are not yet complete.

The Department has been evaluating exposure of nesting females and nests to MC 252 oil using multiple approaches. Physical samples (tissues, nest materials, carapace wipes) have been collected for contaminant analysis and/or for cytochrome P450 studies. Many samples have been analyzed; analysis for the remaining samples is ongoing (except for those samples that the Department has chosen to archive). In addition, as part of the nesting sea turtle work plans, nesting loggerhead and Kemp's ridley females were equipped with satellite transmitters to identify their foraging and inter-nesting behaviors. The Department has also examined foraging patterns using stable isotope analysis of nesting female carapace samples. Stable isotope analysis can provide information both about the trophic level at which they are feeding and about general geographic locations. Samples were collected from adult nesting females of two species (Kemp's ridley in 2010-2012 and loggerheads in 2012). Analytic results to date suggest a change in Kemp's ridley foraging locations for 2011 and 2012 relative to 2010; however, full analysis and interpretation of these results and the development of associated documentation are still underway.

This effort is yielding important information about the nature and timing of habitat use, and the principal investigators have published several papers in the peer reviewed literature with components of these findings. Telemetry research to date has also demonstrated significant overlap between habitats used by these animals, and the locations of surface oiling from the Oil Spill. The Department is working closely with NOAA on this exposure analysis, as NOAA and Department scientists continue to refine the oil-on-water data product.

Methods

In 2015, the Department's principal investigators will continue work on data analysis and integration into the Trustees' final assessment documentation by:

1. Using sea turtle telemetry data to determine the extent foraging and/or inter-nesting behavior changed after the Oil Spill. Preliminary analyses suggest detectable behavioral changes. Findings from isotopic analyses will be incorporated with telemetry data to better understand the shifts in foraging habitat use with time.
2. Finalizing the analysis documenting the overlap between sea turtle nesting and sand beach oiling and response activity.
3. Actively participating in the Life History Tables Working Group described in NOAA's Third Interim Partial Claim. This is critical to both injury quantification and restoration planning.
4. Participating in assessment data management activities related to sea turtles. Examples include additional quality assurance/quality control (QA/QC) activities, data verification and validation work, peer review of written reports, and coordinating these activities with co-Trustees and BPXP, as appropriate.
5. Drafting and finalizing various written reports summarizing the analyses and findings for incorporation into the Trustees' NRDA sea turtle interpretation report.

Relationship to Other Activities and Data

This IPC activity is directly related to each sea turtle assessment study funded to date by either BPXP or the NPFC. The Sea Turtle Nesting, Foraging and Habitat Use report (resulting from activity #1 above) builds on data developed in NRDA nesting and transmitter studies conducted from 2010 through 2014. No other trustee is conducting assessment activities on nesting, hatchling or foraging sea turtles.

The Department has conducted several assessment activities to evaluate exposure and injuries to loggerhead and Kemp's ridley sea turtles and their nests, which have either been funded by the NPFC or through cooperative assessment activities with BPXP. The Department has examined nesting female sea turtles in the field for evidence of illness or tumors, and collected carapace swabs, tissue samples, blood samples, and acute samples for analysis in the Turtle Analytical Plan (TAP). The TAP includes chemical, biochemical and toxicological analyses to measure and determine exposure and effects of the Oil Spill in loggerhead and Kemp's ridley sea turtles. Additionally, DOI tagged sea turtles with satellite transmitters to evaluate nesting sea turtles exposure to oil. The Department also evaluated nesting emergence and success through coastal surveys following nesting, as well as an evaluation of nesting emergence and success for any remaining eggs that did not hatch through incubation and protected corraling. The data collection and analytical work that

DOI has conducted provided information to assist DOI in evaluating loggerhead and Kemp's ridley exposure to the Oil Spill and resulting injuries. The Sea Turtle Nesting, Foraging and Habitat Use report is an important component in the overall assessment of injury to sea turtles and their nests. That plan builds upon the previously conducted data collection and analytical work to evaluate exposure and injury by quantifying injury in the context of occurrence, distribution and behavior of nesting, inter-nesting and post-nesting sea turtles in the areas impacted by MC 252 oil during, and in the years following, the Oil Spill. The final report generated through this analysis will be incorporated into an interpretive report that will summarize data and findings for sea turtles impacted by the Oil Spill.

Coordination and Implementation

The sea turtle analysis and integration effort as implemented as part of this NRDA will be coordinated with co-Trustees and integrated into the Sea Turtle Exposure and Injury Assessment Report described in NOAA's Third Interim Partial Claim. This report will be coauthored by both NOAA and the Department.

Principal Investigators

Department staff involved in these activities include Charles Wood, Donna Shaver, Kristen Hart, Michael Hooper, Kevin Reynolds, John Rudolph, and Chris Schmitt. These staff coordinate the DOI sea turtle assessment and restoration planning with the NOAA sea turtle assessment and restoration planning components. The goal of the Department and NOAA is to produce a single comprehensive Sea Turtle Exposure and Injury Assessment Report.

RP Involvement

The Department and NOAA are jointly leading the sea turtle injury assessment on behalf of the Trustees. Both agencies have worked cooperatively with BPXP to varying degrees across multiple work plans throughout the assessment. For example, both the Department and BPXP participated on initial coordination calls in the first years of the DWH NRDA that were organized through the sea turtle technical team. The 2012 TAP as well as the 2013 Kemp's ridley and loggerhead sea turtle nesting plans, were conducted under cooperative work plans developed with BPXP. Data results from these plans have been shared with BPXP. However, the interpretation of data, which began in 2012, and the production of the Trustee-internal interpretive reports will be conducted independently of BPXP.

Administrative Record

The Department team will continue to respond to requests for documents to complete the administrative record. This activity will include providing new documents, data related to fieldwork and/or analyses, and preparation of the draft DARP. The costs of the Department team in gathering and providing these records for Administrative Record purposes is captured here; the costs of capturing and processing these records for Administrative Record purposes is captured under the Administrative Record Tasks, Activity #16 in the Claim.

Level of Effort

This activity will be completed by DOI employees identified above, for a total cost of \$700,000, with an associated contingency cost of \$105,000.

4.2. 2015 IPC #9: Statistical Analysis of Nesting and Hatchling Trends for the Kemp's Ridley Sea Turtle

Purpose of Activity and Injury Assessment Need

This assessment activity will quantify the decrease in Kemp's ridley nests that can be attributed to the Oil Spill. This will be accomplished by comparing pre-spill nest and hatchling counts (1997 – 2010) to post-spill nest and hatchling counts (2011 – 2013) while accounting for natural variation and background conditions not attributable to the Oil Spill. The final work product developed for this activity will be a cumulative report providing a statistically valid estimate of lost Kemp's ridley nests attributable to the 2010 Oil Spill. This report will be an important component of the Trustees' total sea turtle injury quantification.

Methods

The Department will obtain the services of a contractor to complete the three components of this activity, as described below.

1. The first component of this IPC activity will compare the pre-Oil Spill (2000-2010) annual nest counts for Texas beaches to the post-Oil Spill (2011-2014) nest counts for the same beaches. This analysis will encompass nesting data from the Kemp's ridley Sea Turtle Recovery Program (jointly managed by the Department, NOAA and Mexico's National Commission of Natural Protected Areas) and other sources to evaluate changes in the number of nests post-Spill that are outside the expected natural variation. We anticipate utilizing a regression-based trend analysis, or similar statistically-based estimation method.

2. The second component of this IPC activity will be dependent upon the results of the first component described above. Should the initial analysis indicate lower post-Oil Spill nesting counts (when compared to pre-Oil Spill nesting counts), a second analysis will be conducted to evaluate the geographic extent of the nesting decline. The geographic extent is important because Kemp's ridley nests laid in Texas each year represent only a portion of the total Kemp's ridley nesting in the Gulf of Mexico. The majority of the nests are laid on Mexico beaches each year, and satellite telemetry work has provided evidence that turtles nesting in both Texas and Mexico have been impacted by the Oil Spill. Preliminary analysis of historical nesting data indicates a close correlation between nesting in Texas and nesting in Mexico, and the second analysis of this assessment plan will evaluate this correlation with an emphasis on post-spill nesting activity. The Trustees hypothesize that a decline in nesting in Texas (as quantified in activity #1 above) will indicate a similar decline in nesting in Mexico, and this component will provide the robust statistical analyses to test that hypothesis.
3. The final component of this assessment activity will include the development of a comprehensive report written in standard scientific format (including introduction, detailed description of methods, results, and discussion) that identifies the outcomes of components #1 and #2 (if necessary) described above. The report will provide an estimate of lost nests not attributable to natural variations or background conditions within the nesting period evaluated. It will also provide a comparison and discussion of these results to data available from the Kemp's ridley Sea Turtle Recovery Program population models. The discussion and comparisons will utilize the latest data and results from the Kemp's ridley recovery programs population modeling work. They will also include details of relevant summary statistics or other appropriate techniques used in this comparison, and they will make appropriate references to available literature. The discussion and comparison will make qualitative and, where appropriate, quantitative comparisons to results from assessment activities #1 and #2 to the Kemp's ridley recovery plan population models. Other relevant assessment data will be used to support this comparison. The discussion will identify potential reasons for differences between the latest recovery plan population models and the annual and combined time period results from the first two assessment activities in this assessment plan. Discussions will explore the geographic extent of any change in nesting trends identified in this comparison. The final report will express any lost nests for Texas and Mexico as a total number lost annually and as a percent loss from anticipated nesting production.

Relationship to Other Activities and Data

Results from this study may be combined with other study results to identify whether any lost Kemp's ridley nests are attributed to the Oil Spill. The Kemp's ridley statistical analysis will build upon the results of the Department's previous exposure and injury related assessment activities by quantifying injuries to nesting Kemp's ridley sea turtles and their nests. No other Trustee is conducting assessment activities on nesting and hatchling sea turtles. The Department has conducted several assessment activities to evaluate exposure and injuries to Kemp's ridley sea turtles and their nests, which have either been funded by the NPFCA or through cooperative assessment activities with BPXP. Department staff have examined nesting female Kemp's ridley sea turtles in the field for evidence of illness or tumors, and collected carapace swabs, tissue samples, blood samples, and scute samples for analysis in the TAP. The TAP includes chemical, biochemical and toxicological analyses to measure and determine exposure and effects of the Oil Spill in Kemp's ridley sea turtles. Additionally, Department staff and Department contractors tagged Kemp's ridley sea turtles with satellite transmitters to evaluate nesting Kemp's ridley sea turtles' exposure to oil. The Department also evaluated Kemp's ridley nesting emergence and success through coastal surveys following nesting, and evaluated nesting emergence and success for any remaining eggs that did not hatch through incubation and protected corralling. The data collection and analytical work that the Department has conducted provide information to assist the Department in evaluating Kemp's ridley exposure to the Oil Spill and resulting injuries. The Kemp's ridley sea turtle statistical analysis is an important component in the overall assessment of injury to Kemp's ridley sea turtles and their nests because it builds upon the previously conducted data collection and analytical work to evaluate exposure and injury by quantifying injury in the context of a total number of nests lost annually and as a percent loss from anticipated nesting production. The final report generated through this analysis will summarize data and findings for sea turtles impacted by the Oil Spill, and will be incorporated into the Sea Turtle Exposure and Injury Assessment Report for the DARP, which will be written by both NOAA and the Department.

Coordination and Implementation

The Kemp's ridley statistical analysis implemented as part of this NRDA will be coordinated with co-Trustees and integrated into Sea Turtle Exposure and Injury Assessment Report described in NOAA's Third Interim Partial Claim.

Principal Investigators

DOI intends to contract statistical expertise to achieve the objective of this activity. Department staff include Charles Wood, Chris Schmitt, Kristen Hart, Kevin Reynolds, John Rudolph, Michael Hooper, and Donna Shaver. A primary principal investigator and technical

specialists have not yet been identified; however, a preliminary panel of potential principal investigators and technical specialists has been identified.

RP Involvement

Both the Department and NOAA have worked cooperatively with BPXP on many previous sea turtle assessment work plans. The Department's TAP and its subsequent addendums, as well as the Kemp's ridley and loggerhead sea turtle nesting plans, were conducted under cooperative work plans developed with BPXP. Data results from these plans have been shared with BPXP. However, we anticipate that the interpretation of data which began in 2012 and the production of the Trustee-internal interpretive reports will be conducted independently by BPXP and the Trustees.

Level of Effort

Total estimated contract costs for this activity are \$75,000 with an associated contingency of \$11,250. Oversight and related support will be completed by the Department staff identified above, for a total cost of \$150,000, with an associated contingency cost of \$22,500.

4.3. 2015 IPC #10: Gulf Sturgeon Injury Quantification

Purpose and Injury Assessment Need

Direct contact of aquatic animals with waterborne contaminants and ingestion of contaminated sediment and prey items provide a pathway for potential exposure of fish to introduced xenobiotics associated with the Oil Spill. The spatial and temporal extent of the Oil Spill raised immediate concerns among the Trustees about exposure and subsequent injury to federally-listed Gulf sturgeon residing and foraging in the Northern Gulf of Mexico. Under a cooperative assessment, Gulf sturgeon were captured, assessed and tagged with acoustic transmitters in the fall of 2010 during their out-river migration. Following intense tracking of their movements within the Gulf of Mexico that winter, Gulf sturgeon were again captured in the spring of 2011, during their in-river migration. Similar to the fall collections, sturgeon received general health assessments, and blood samples were collected. This process of capturing and tagging fish and monitoring the spatial and temporal patterns of fish movement in the northern Gulf of Mexico was repeated during fall 2011 through spring 2012 (i.e., Phase II). To strengthen our injury assessment and control for potentially confounding variables encountered in the field, the Trustees also initiated a laboratory study involving controlled exposures of shovelnose sturgeon (a surrogate, and closely related species to the listed Gulf sturgeon) to the MC 252 oil.

Patterns of Gulf residency, as revealed by telemetry, and the extent of oiling along Gulf shorelines provided the foundation for a Trustee model of potential exposure of Gulf sturgeon to the Oil Spill. In 2013 the Department developed a draft report on potential exposure and injuries to threatened Gulf sturgeon due to the Oil Spill. This report presents information on wild Gulf sturgeon sampled in 2010-2012 and, in particular, describes the study's results on: telemetry, DNA damage, hematology endpoints, fish health condition, and survival. Other activities conducted to date include measuring additional endpoints in samples from these same wild fish that would be indicative of injury (e.g., genomics) and completing the toxicological laboratory studies on the shovelnose sturgeon.

Methods

The Department is requesting funding for contractor support to provide technical assistance in coordinating review and completion of sturgeon data reports and interpretive reports, to coordinate integration of sturgeon data results and interpretation into DARP development, and to assist with restoration planning and potential equivalency analysis. Reports will require multiple rounds of review before finalization. Integration of sturgeon injury information will be coordinated among co-Trustees and incorporated into the comprehensive DARP.

Relationship to Other Activities and Data

The Department is the only Trustee completing assessment activities for the listed Gulf sturgeon. We anticipate integrating the sturgeon data, conclusions on injury and sturgeon restoration planning into the overall fish injury assessment led by NOAA.

Coordination and Implementation

To accomplish this IPC activity, the Department will obtain the services of a contractor. The contractor will work with Department injury assessment and planning staff who are involved with the Gulf sturgeon assessment to coordinate review of reports and complete them for inclusion into the DARP. The contractor will assist with coordinating and integrating Gulf sturgeon data results into claim development, as well as help with restoration planning as needed.

Administrative Record

The Department team will continue to respond to requests for documents to complete the administrative record. This activity will include providing new documents, data related to fieldwork and/or analyses, and preparation of the draft DARP. The costs of the Department team in gathering and providing these records for Administrative Record purposes is

captured here; the costs of capturing and processing these records for Administrative Record purposes is captured under the Administrative Record Tasks, Activity #16 in the Claim.

RP Involvement

Pre-assessment (Phase I: Fall 2010 – Spring 2011) of Gulf sturgeon injury was conducted as a cooperative work plan entitled "Mississippi Canyon 252 Pre-Assessment Plan for the Collection of Data to Determine Potential Exposure and Injuries of Threatened Gulf Sturgeon." The RP or their representatives were involved in all field work and received all data collected as outlined in the work plan. Assessment phase (Phase II: Fall 2011 – Spring 2012) work was not conducted as a cooperative work plan and was completed with very little involvement from the RP. The RP was involved in the initial development of the Phase II work plan, but no agreement was reached as to the content or the need for conducting assessment work as listed in the work plan, and the RP declined to participate. Interpretive summary of both phases is being conducted without input from the RP and will represent the Department's interpretation of the collected data.

Principal Investigators

The Department staff involved in overseeing and coordinating the Gulf sturgeon injury assessment are Donald Tillitt, Diane Nicks, David Alvarez, Robert Gale, Jesse Arms, Glenn Constant, Adam Kaeser, Mike Randal, Kevin Reynolds, John Rudolph and Clare Cragan. The contractor for this activity has not yet been selected.

Level of Effort

Total estimated contract costs for this activity are \$72,500 with an associated contingency of \$10,875. Oversight and related support will be completed by Department staff identified above, for a total cost of \$95,000, with an associated contingency cost of \$14,250.

5. DOI Managed Lands and Facilities

5.1. 2015 IPC # 11: Assessing Submerged Oil Mats by Remote Sensing Survey and Diver Characterization at Gulf Islands National Seashore (GUIS)

Purpose and Injury Assessment Need

More than four years after the Oil Spill, NPS beaches at Gulf Islands National Seashore (GUIS) continue to be re-oiled by submerged oil mats (SOMs), which may be continuing to impact NPS resources such as seagrass, sea turtles, fish, mammals, and threatened and

endangered nesting shorebirds. Location and characterization of SOMs will assist the Trustees' evaluation of SOMs as a source of on-going injury to natural resources within the park. This information will also inform potential removal activities.

Methods

Prior activities included diver deployment and direct examination of areas of GUIS bottomlands that are more likely to harbor SOMs, as indicated by data mining of GIS data in the Environmental Response Management Application (ERMA), beach re-oiling, past oiling, predictive modeling, oil boom placement, and remote sensing data. Diver deployment included direct visual examination of areas of interest combined with video and photographic documentation.

The Department is requesting funding to cover Department staff efforts to complete a full written report including all results of the research objectives and a full analysis of all digital data. This report will include any effective methodologies developed in locating areas of potential trapped or buried oil, the effectiveness of the side scan and RoxAnn sonars in identifying these areas, and our understandings and hypotheses about the factors that lead to the formation, concentration, burial, exposure, re-suspension and deposition of SOMs. Details regarding where submerged oil was found will be displayed digitally in the ArcGIS workspace and subsequent products. The digital remote sensing data will be presented in three forms: raw, processed, and interpreted. Raw and processed data will be included on a hard drive, and interpretations of the digital data will be included in the final report as figures or images with corresponding descriptions. All digital photography, ArcGIS files, scanned written notes, and scanned hand drawn maps will also be included in the digital package.

Additionally, in 2015 the project results will be incorporated into the DARP.

Relationship to Other Activities and Data

These SOM assessment activities are managed and administered by the NPS Submerged Resources Center, which coordinates directly with Gulf Islands Resources staff and external collaborators working on similar issues as part of the Oil Spill response. Although all reports and written products will be shared with co-Trustees, no other Trustees actively participated in the GUIS SOM assessment.

Principal Investigators

Department personnel involved in this effort include Dave Conlin and James Haas, Bert Ho, John Bright, Andres Diaz, Susanna Pershern, Heather Best, Arthur Ireland, Jessica Keller, Kevin Reynolds, Clare Cragan, and Desiree Sousha.

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RP Involvement

In 2013, BPXP funded contractor support for the Department's SOM assessment activities which commenced in spring 2014; BPXP did not have representatives in the field for this effort.

Administrative Record

The Department team will continue to respond to requests for documents to complete the administrative record. This activity will include providing new documents and data related to fieldwork and/or analyses, and preparation of the draft DARP. The costs of the Department team in gathering and providing these records for Administrative Record purposes is captured here; the costs of capturing and processing these records for Administrative Record purposes is captured under the Administrative Record Tasks, Activity #16.

Level of Effort

This activity will be completed by Department employees identified above, for a total cost of \$15,000, with an associated contingency cost of \$2,250.

5.2. 2015 IPC # 12: Sand Beach Response Injury Quantification

Purpose and Injury Assessment Need

Beaches across the Gulf have experienced surface and subsurface oiling as a result of the *Deepwater Horizon* oil spill. The initial release of oil exposed sand beaches and other natural resources to large amounts of oil, and required response actions to remove oil from sand beaches from Florida to Texas. Re-oiling from re-mobilization of buried oil and submerged oil mats in the nearshore environment continues to this day.

Response actions include the use of various manual and mechanical methods to remove oil and debris from the sand beaches. These actions have caused modification or impairment of habitats and have resulted in injury to natural resources (referred to herein as "response injury"). A literature review on the effects of oil in beach habitats conducted by co-Trustees working on the shoreline assessment further supports the finding that, when compared to the condition of unoiled beaches, some level of injury is caused by oil fouling and subsequent habitat modification. As the oiling of beaches continues, the Department and co-Trustees continue to assess impacts to sand beach habitats due to both *Deepwater Horizon* oiling and response injury.

Studies have demonstrated a negative relationship between oiled beaches and both beach invertebrate communities and habitat quality. Oil-related sand beach injury is being assessed

by the Trustees using the shoreline oil exposure map currently under development within the shoreline technical team. This map outlines the extent, duration, and degree of oiling across various stretches of shoreline impacted by the *Deepwater Horizon* incident. The oil-related sand beach injury assessment will include evaluation of the likely impacts of the different oiling exposure categories and will determine the degree of oil-related impacts to sand beach ecosystem services.

Coupled with oil-related injuries, the Department and co-Trustees are also assessing the effects of response injury on sand beach habitats. The objective of the Sand Beach Response Injury Assessment is twofold: 1) compile the various sources of information that may be used to assess injury related to response actions on the shoreline, and 2) categorize and rank the effects of the response action on the sand beach habitat. Information on the temporal and spatial extent of response-related injuries exists within many organizations, agencies, and databases, and has been difficult to obtain.

As of June 2013, the response actions were deemed complete for the shorelines in Florida, Alabama, and Mississippi. Once a shoreline segment is moved out of response, the U.S. Coast Guard and BPXP have established the Middle R program. In Louisiana, shoreline cleanup operations on sand beaches extended for a longer period. As of the end of the first quarter of 2014, the last sand beaches still in active treatment in Louisiana were moved out of response. The Department is continuing to collect information associated with impacts from the buried oil removal activities in these areas. Removal activities are expected to have had significant impacts on the sand beach invertebrate fauna and cause disruption to use by avian species in these areas.

Tasks related to sand beach injury assessment fall into three assessment categories within the context of the ongoing NRDA: 1) Sand Beach Oil Exposure and Injury Quantification, 2) Sand Beach Response Injury Exposure and Injury Quantification, and 3) Comprehensive Sand Beach Injury Quantification. As such, the Department is utilizing contractor support (previously funded by BPXP) for three purposes: 1) to develop an updated analysis of sand beach injury resulting from the MC 252 release of oil as part of the ongoing NRDA, 2) to acquire and organize new information obtained as part of the response injury data management efforts that are associated with the categories of potential injury and/or correlating response actions previously identified, and 3) to update the comprehensive beach injury assessment technical report with information gained from both the ongoing response as well as from coordination with the response injury data management efforts.

Deliverables Produced

Previously funded deliverables produced, that will be revised or updated as a result of Department and contractor efforts include:

- Sand Beach injury analysis (Task #1): The Contractor has produced and will update, as necessary, an analysis of sand beach injury resulting from the Oil Spill, including releases and response activities as part of the ongoing NRDA. The associated oiling and response injury categories and extents will be utilized, along with literature-based evaluations and other studies currently underway, to determine the degree of impact to sand beach ecosystem services. This work will include evaluation of the likely impacts for the different oiling exposure and response injury categories for sand beach habitats. The contractor will also work collaboratively (in order to avoid any duplication of efforts) with the principal investigators of relevant NRDA studies to characterize the impacts of oiling and response activities to beach fauna.
- New information acquired and organized as part of the response injury data management efforts (Task #2): The identification and collection of information about previous and ongoing response efforts for the *Deepwater Horizon* oil spill are not completed. Work is continuing on cooperative response injury data management with BPXP. To more clearly define the extent and duration of injury to the sand beach habitat, the contractor will continue, working with the Department and its co-Trustees to acquire and organize new information obtained as part of the response injury data management and information collected from state efforts that are responsive to the categories of potential injury and/or correlating response actions previously identified.

Additional deliverable – not previously funded - for which the Department is seeking funding in this Claim:

- Updated comprehensive beach injury assessment technical report (Task #3): To fully evaluate the effects of the *Deepwater Horizon* oil spill on the beach habitat, the contractor will update the comprehensive beach injury assessment technical report with information gained from the ongoing response and coordination with the response injury data management efforts. This task will result in a comprehensive technical report which combines information from Task 1 and 2 described above.
- Sand Beach Injury Quantification Final Report: To fully evaluate the effects of the *Deepwater Horizon* oil spill on the beach habitat and infauna, the Department is

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seeking contractor support to produce a comprehensive beach injury quantification technical report.

Relationship to Other Activities and Data

The Department is the lead Trustee for assessing oil and response injury to the sand beach habitat resulting from the Oil Spill and continues to work closely with its co-Trustees, coordinating efforts to identify and quantify injuries to the sand beach habitat. It is anticipated that the final sand beach injury will quantify injuries to both federally-owned and state-owned lands.

Administrative Record

The Department team will continue to respond to requests for documents to complete the Administrative Record. This activity will include providing new documents and data related to fieldwork and/or analyses, and preparation of the draft DARP. The costs of the Department team in gathering and providing these records for administrative record purposes is captured here; the costs of capturing and processing these records for administrative record purposes is captured under the Administrative Record tasks, Activity #16 in this Claim.

Principal Investigators

Department staff involved in overseeing and coordinating the sand beach injury assessment are Charles Wood, Kevin Reynolds, James Haas, John Rudolph, John Carlucci, Colette Charbonneau, and Denise Klimas. The contractor involved in this activity is Research Planning Inc., and the principal investigators are Jacqui Michel and Stephen Fegley.

RP Involvement

The Department, as the lead for the assessment of sand beach injuries, along with its co-Trustees and NOAA, has worked cooperatively with BPXP throughout the exposure assessment phases. Weekly coordination calls were conducted through the shoreline technical team. Data collection was conducted under a cooperative work plan with BPXP. The interpretation of data which began in 2012 and the production of the Trustee-internal interpretive reports will be conducted independently of BPXP.

Level of Effort

Total estimated contract costs for this activity are \$38,594, with an associated contingency of \$5,789. Oversight and related support will be completed by Department employees identified above, for a total cost of \$46,500, with an associated contingency cost of \$6,975.

5.3. 2015 IPC # 13: Assessment of Submerged Aquatic Vegetation (SAV)

Purpose and Injury Assessment Need

The Department has led two assessments of injury to submerged aquatic vegetation (SAV) on Department-managed lands and facilities: one on Jean Lafitte National Historic Park (JELA) and the other on Gulf Islands National Seashore.

In response to the Oil Spill, Mississippi River freshwater flows through the Davis Pond Diversion to Lake Cataouatche were increased to reduce the potential for oil intrusion into the inland marshes, including JELA. Assessment data from JELA, obtained cooperatively with BPXP in 2010 and 2011, suggest that the SAV community in JELA was negatively affected by the increased freshwater flow to JELA during the Oil Spill response. Additional data collected independently of BPXP in the fall of 2012 confirmed these findings. Surveys collected data on water quality parameters, sediment and water nutrient levels, SAV community structure and floating aquatic species abundance.

The data show that the sustained increase in freshwater flow resulted in reduced salinities in JELA. It also increased loads of nitrogen and phosphorous into the downstream system leading to JELA, throughout the summer and into the fall of 2010. Following these changes in the aqueous habitat, there were notable changes in SAV community structure, including significant reductions in SAV diversity in JELA from fall 2010 to fall 2012. Simultaneously SAV diversity at reference stations significantly increased over the same period. These factors provide evidence that significant changes occurred within the JELA's ecosystem following response to the 2010 Oil Spill. In May 2014, the contractor supporting the JELA assessment effort, Weston Solutions, Inc., published a draft report on SAV injury in JELA.

Relationship to Other Activities and Data

These assessments occurred on Department-managed lands, no other Trustees are participating in these activities; however, the draft report has been shared with co-Trustees. Monitoring data obtained from these activities are being used to inform Trustee-wide restoration planning and DARP development.

Deliverables Produced

In 2015, Department staff working on SAV in JELA and GUIIS will continue their work on data verification/validation and work towards finalizing the draft report which will be used in restoration planning and inclusion into the DARP.

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Principal Investigators

Department staff members involved in these activities include Eva DiDinato, Jim Haas, Heather Best, Jeremy Cantor, Cassity Bromley, Kevin Reynolds, John Rudolph and Jolene Williams.

RP Involvement

BPXP funded and worked cooperatively for the first three field studies for the JELA assessment (fall 2010, spring 2011, and fall 2011).

Administrative Record

The Department team will continue to respond to requests for documents to complete the administrative record. This activity will include providing new documents and data related to fieldwork and/or analyses, and preparation of the draft DARP. The costs of the Department team in gathering and providing these records for Administrative Record purposes is captured here; the costs of capturing and processing these records for Administrative Record purposes is captured under the Administrative Record Tasks, Activity #16 in the Claim.

Level of Effort

This activity will be completed by Department staff identified above, for a total cost of \$25,000, with an associated contingency cost of \$3,750.

6. Injury Assessment, Management, and Administration

6.1. 2015 IPC # 14: Technical and Logistical Support for DOI's *Deepwater Horizon Oil Spill NRDA*

Purpose and Injury Assessment Need

The Department leads several areas of the DWH NRDA (e.g., birds, sand beach, response information, nesting sea turtles, etc.). Numerous individual field and analytical work plans have been developed and are continuing to be developed as part of this NRDA. Analyses and interpretation of data collected through individual Department-led NRDA assessments is ongoing. Contractors assist in managing the synthesis of ongoing assessment activities, including study implementation, Trustee coordination, and data analysis into a comprehensive and integrated injury case. The Department's efforts in this case-wide management effort will also provide the framework for the work that will be required to develop the comprehensive DARP. The Department has trust resource responsibilities separate and distinct from NOAA and many of the states and as such the Department's

injury assessment and restoration planning efforts must be specific to our resources. However, the Department recognizes that natural resources for which we have trust responsibilities may benefit from NOAA-identified restoration goals and projects. Understanding NOAA's injury quantification and restoration efforts and working with the agency to develop a unified injury case and restoration plan avoids double counting and double recovery.

Methods

Technical and logistical support activities provided by the contractor are described below. Department staff work with the contractor and oversee the contractor's activities.

1. Provide case-wide technical and logistical support to the Department DWH NRDA case team for the variety of Department-led assessment activities. Logistical support includes coordinating ongoing and planned assessment activities with co-Trustees and BPXP, as appropriate. Logistical support also includes facilitating meetings, developing agendas, and coordinating participation by the relevant individuals or parties including facilitating Trustee and principal investigator interaction, and, where appropriate, interaction with BPXP. Logistical support includes oversight of the distribution and review of technical reports developed as part of the assessment. Technical support includes both product development for parts of the assessment as well as review of the individual assessment results and an evaluation of their contribution to the overall injury case. Technical support also includes the collection and analysis of information that is generally available in the literature or from experts knowledgeable about the effects of oil on natural resources. Contractors also provide technical support for the synthesis and integration of Department-generated data and analyses with other ongoing activities to document exposure and injury to resources and their supporting habitat, including NOAA's shoreline, toxicity, and modeling efforts. In addition, related but separate NRDA activities led by other co-Trustees are integral to improved understanding of the effects of the Oil Spill on natural resources. Collectively these efforts contribute to and support the Department's assessment of the effects of MC 252 oil exposures and the injuries caused by the oil to natural resources for which the Department has trust responsibilities. Contractors facilitate monthly conference calls with co-Trustees to discuss components of the bird injury case. They also facilitate within-Department agency coordination of the turtle and sturgeon injury case. In addition, contractors support the Department in reviewing and providing technical comments on end-of-study reports and interim reports. The contractor also facilitates Department bird injury meetings.

2. Technical support services also include development and incorporation of a rigorous peer review process for reports and findings developed as part of the assessment. A consistently applied peer review process with specific requirements will help improve reliability and ensure methods are standardized and analyses are defensible. Peer review of reports and findings is essential for confirming natural resource injury identification and quantification so that restoration goals and plans can be developed to restore injured natural resources. In the Department's 2014 IPC, we estimated that 30 reports would go through the peer review process. Due to the number of assessment activities that the Department has conducted, the number of reports requiring peer review has increased. We now estimate that an additional 20 reports will need to be peer reviewed in 2015. Therefore, we are requesting funding for contractor assistance with this activity associated with the additional 20 reports.
3. Data review that includes outside third-party quality assurance/quality control (QA/QC) and data verification/validation is required to assure the Trustees and the public that the data are accurate and complete. Various field and analytical work plans have been developed and implemented as part of the ongoing DWH NRDA. Contractors provide technical assistance to facilitate third party data QA/QC and verification/validation activities on data collected pursuant to DWH NRDA work plans where the Department is the lead. These efforts must be undertaken in coordination with co-Trustees and with BPXP. The Department initiated these efforts in 2013, increased efforts as a focal area in 2014, and will continue to focus heavily on these efforts in 2015. Efforts include, but are not limited to:
 - A. Assist Trustees in conducting transcription verification of data sets in the DOI DWH NRDA database, as needed.
 - B. Assist the Trustees, principal investigators, and BPXP in conducting data validation for the NRDA datasets and provide documentation, as necessary, of the data validation process.
4. Technical and logistical assistance is also necessary to support the Department's efforts in establishing a comprehensive and integrated injury case and restoration-based claim which will provide the framework for supporting development of the Department's chapters of the comprehensive DARP. The Department's coordination with NOAA on the case-wide DARP will become much more extensive during 2015.

Relationship to Other Activities and Data

As described in the Department's 2013 Interim Partial Claim, BPXP funded \$1,188,628 for two assessment plans: *Quality Assurance and Quality Control Support for U.S. Department of Interior Managed Data Collected During the Deepwater Horizon/MC 252 Oil Spill Natural Resource*

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Damage Assessment, and Technical and Logistical Contractor Support for U.S. Department of the Interior Deepwater Horizon/MC 252 Oil Spill Natural Resource Damage Assessment for 2013. With these funds, the Department established a cooperative process for case-wide verification and validation of data and began that process. BPXP provided the Trustees with a list of priorities for cooperative verification and validation for bird data and that has been incorporated into our priorities. During 2015 it is anticipated that appropriate datasets for Kemp's ridley and loggerhead sea turtles will have QA/QC completed as well as appropriate datasets for the Gulf sturgeon assessment.

In addition, it is anticipated that in 2015 the following datasets will complete final BPXP review in the cooperative verification and validation process:

- Carcass Drift (BS #1D)
- Breeding Shorebirds (BS #8)
- Piping Plover Oiling and Abundance (BS #7)
- Jean Lafitte Submerged Aquatic Vegetation
- Non-breeding Shorebirds data (BS #5)
- Master Segment Dataset
- Master Birds Dataset

We anticipate that during 2015 the following datasets will be shared with BPXP for cooperative verification and validation leading to complete and finalized datasets:

- Colonial Waterbirds Oiling data (BS #4)
- Pelagics Transect data (BS #6)
- Kemp's Ridley Nest Sample Collection data
- Master Search Effort dataset

We anticipate that in 2015 several of following datasets listed below will also be shared with BPXP for cooperative verification and validation. However, for these datasets, completion of cooperative verification and validation with BPXP is not anticipated during 2015. If other datasets are identified they will be shared following Trustee review.

- Loggerhead Nest Sample Collection
- Loggerhead Nesting Females data
- Waterfowl data (BS #10)
- Wintering Open Water Waterbirds data (BS #12)
- Secretive Marsh Birds Callback data (BS #3)
- Osprey Productivity data (BS #9)
- Pelagic Point Count survey data

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- Aerial survey data
- Kemp's Ridley Nesting Female data
- Sturgeon data
- Beach mouse Habitat Assessment Plan data

Principal Investigators

The Department staff involved in this activity include Ashley Mills, Veronica Varela, Jon Hemming, Pete Tuttle, Kevin Reynolds, Clare Cragan, Debora McClain, Erin Chandler, Paige Martin, Glenn Constant, Charles Wood, and Kate Healy.

RP Involvement

As described above, the Department coordinates dataset verification and validation, and quality control activities with BPXP. The Department does not interact with BPXP in conducting other activities described in this Technical and Logistical Support section.

Administrative Record

The Department team will continue to respond to requests for documents to complete the administrative record. This activity will include providing new documents and data related to fieldwork and/or analyses, and preparation of the draft DARP. The costs of the Department team in gathering and providing these records for Administrative Record purposes is captured here; the costs of capturing and processing these records for Administrative Record purposes is captured under the Administrative Record Tasks, Activity #16 in the Claim.

Level of Effort

Total estimated contract costs for this activity are \$332,440 with an associated contingency of \$49,866. Oversight and related support will be completed by Department staff identified above, for a total cost of \$450,000, with an associated contingency cost of \$67,500.

6.2. 2015 IPC # 15: Comprehensive Database for DOI-lead Studies, Analytical and Observational Data, Infrastructure and Administration

Purpose and Injury Assessment Need

Since the Oil Spill began, a large number of samples, instrument files, photographs, and visual observations have been acquired to quantify injury and to scale appropriate restoration needed because of the Oil Spill. The Department, in coordination with NOAA and the Data Management technical team, has led and continues to lead the effort to ensure the

preservation of all such files and data for Department-led plans. This effort has entailed tracking, storage, maintenance, and sharing of these data with relevant technical teams and the wider Trustee community. With limited exception, data generated from implementation of approved NRDA work plans for which the Department is the lead are/will be entered into the DOI *Deepwater Horizon* NRDA database.

Methods

In 2014, the Department finalized the structure of the new DOI Database (DOID), programmed the user-interface to accept new information (e.g., data coming out of validation/verification process), and created a connection to share the data through NOAA's Data Integration, Visualization, Exploration, and Reporting (DIVER) data query, exploration, and reporting tools. The key objective of these activities has been to provide Trustee users with the ability to search, analyze, and retrieve the data by 1) preserving and managing Department-led NRDA data in a single repository; and 2) aligning and integrating those data into DIVER. As a result, DOID serves as the core repository of Department-lead data and DIVER serves as the end-user data access tool.

In 2015, the Department anticipates focusing on the following efforts:

- Integrate new NRDA data generated or determined applicable for DOID into the database. These efforts also include revisions to data previously included in DOID as results of the verification/validation processes conducted under separate activities. Once these data are integrated into DOID, we will also periodically update DIVER to share all new information with co-trustees.
- DOID is hosted on multiple servers attached to a data array for storage and backup purposes. In 2015, we anticipate continuing to conduct background tasks such as server and software maintenance. This includes operating system patches or other practices to protect the hardware, software, and data.
- In addition to regular maintenance, we expect to incur ongoing costs to host the servers and provide internet connections.
- At this time, the Department does not provide a programmatic integration between DOID and the Louisiana LOSDMS system. Louisiana Trustees currently access Department data through DIVER. If, based on discussions with Louisiana representatives, it is determined that a programmatic connection between DOID and LOSDMS would be beneficial, the Department's data team would work with Louisiana to develop this connection.
- DOID currently focuses on the storage and maintenance of raw data records. Depending upon case needs, the Department's data team may also provide further support by integrating case files such as additional field records and analytical

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products that build off of the raw data to estimate damages. Through such expansion, the Department's data team can facilitate analytic product tracking, related QC efforts, and reporting on overall case integration.

Relationship to Other Activities and Data

Full operation of the DOI DWH NRDA Database enables the Trustees to deliver quality-checked datasets to BPXP, co-Trustees, and DIVER where, ultimately (upon approval by the DWH NRDA Trustee Council), the validated datasets will be made available to the public. The storage and management of data generated by Department-led assessment activities are necessary to facilitate access to assessment files and data by the Trustees, BPXP, and the general public. Furthermore, a comprehensive system ensures we meet our Administrative Record obligations.

The DOI *Deepwater Horizon* NRDA database will store data generated by Department-led pre-assessment and assessment activities during this NRDA. The DOID is the source repository for all Department-led NRDA data. Any updates and integration of these data are handled through DOID. All changes are recorded and links to associated files are maintained. Access to DOID is restricted to data management personnel and the principal investigators responsible for communicating data updates. To provide end users with access to the data, DOID transmits data to DIVER, which is designed as the interface for intuitively searching the vast array of NRDA data collected as part of the assessment process.

Principal Investigators

Principal Department staff associated with this effort include Debora McClain, Gina Ballard, Ashley Mills, Veronica Varela, Jon Hemming, James Hass, Pete Tuttle, Paige Martin, Kate Healy, Charles Wood, Michael Hooper, Glen Constant, and Clare Cragan. Key contractor support includes Daniel Hudgens and Matt Konopka (IEc) and Jim Anderton and Mike Jackson (Solea).

RP Involvement

The Department's data management efforts are conducted independently of BPXP. The Department has not interacted with BPXP as part of this activity, and BPXP does not have access to the information being developed directly within the system.

Administrative Record

The Department team will continue to respond to requests for documents to complete the administrative record. This activity will include providing new documents and data related to fieldwork and/or analyses. The costs of the Department team in gathering and providing

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these records for Administrative Record purposes is captured here; the costs of capturing and processing these records for Administrative Record purposes is captured under the Administrative Record Task #16.

Level of Effort

Total estimated contract costs for this activity are \$900,000 with an associated contingency of \$135,000. Oversight and related support will be completed by Department staff identified above, for a total cost of \$85,000, with an associated contingency cost of \$12,750.

6.3. 2015 IPC # 16: Comprehensive Document Management System for Assessment Administrative Record

Purpose and Injury Assessment Need

As the Federal Lead Administrative Trustee for this NRDA, the Department and the co-Trustees announced the establishment and opening of the Administrative Record (AR) for this NRDA on October 1, 2010 (See Notice of Intent to Proceed with Restoration Planning, 75 Fed. Reg. 06800, at 60802). The establishment of the AR is in accordance with 15 C.F.R. §§ 990.44 and .45. The AR is publicly accessible and is intended to include documents considered by the Trustees during the pre-assessment, assessment, and restoration planning phases of this NRDA. The Department has lead responsibility for the AR; however, the underlying effort to identify, collect, organize, review, and approve materials for inclusion in the AR involves all Trustees. The costs to provide for and maintain a sufficient AR have increased rapidly and exponentially as more data are collected, study plans are finalized, and technical reports are written. This activity supports the continued operation, management, improvement and use of the *Deepwater Horizon* Comprehensive Document Management System for Assessment Administrative Record.

Management of the AR reflects five major components, described in more detail below: (1) identification, routing, and management of legal records from the assessment; (2) leading co-Trustee, joint records management and coordination, including for Trustee Council level legal records management, legal reviews, and public accessibility; (3) contactor support to design, implement and manage the administrative record process from identification through approval and inclusion in the record; (4) hardware and data architecture for legal document management; and (5) external website support to facilitate public access and usability.

1. Identification/management of legal assessment records for the AR from Department-led or managed activities. This component includes searches, collection, organization, routing, and management of AR records from Department-led

technical teams, NRDA operational support groups, etc., that are candidate for inclusion in the NRDA AR.

2. Leading joint legal management of records with co-Trustees. As the Lead Administrative Trustee, the Department will take a leading role in providing legal guidance for AR record searches, defining protocols and platforms for joint legal reviews, and providing services appropriate to support AR decision-making processes at the Trustee Council level, including records management, joint legal review, redaction review for Department records, and public accessibility.
3. Development of a technology system to facilitate the efficient collection, review and disposition of candidate records for inclusion in the AR. In addition to the architecture of the Administrative Record Review process, the Department will hire contractor support on behalf of the Trustees to manage the Assessment Administrative Record review process.
4. Hardware and data architecture. Candidate Trustee records for the AR extracted from the Department's document management systems (described above) will be voluminous, and will only increase with inclusion of candidate records from other Trustees. Existing data and records management systems are not sufficient to support the Trustees' legal record review obligations for the AR and this NRDA. The Department intends to create a system for the AR that is compatible with NOAA's document management systems, as well as the Department's larger, more comprehensive document management system (described in activity above). An AR-focused document repository for the Department and our co-Trustees will require specially designed software and hardware, as well as information management architecture for tagging, cataloging, and creating document workflows for processing and reviewing documents. Staff and contractor time is required to design the architecture and process the documents in workflows that have been agreed to by all of the Trustees. These activities will occur continuously over the entire span of 2015.
5. Additional web support to facilitate the public's ability to access the Administrative Record. This component will include, but is not necessarily limited to, re-design of the website.

Methods

The Department is responsible for three major activities to achieve these goals:

- Hiring contractor support to develop a technology system to facilitate the efficient collection, review and disposition of candidate records for inclusion in the NRDA AR;

- Initiating the collection, organization, routing, and management of AR records from technical teams, NRDA operational support groups, etc., that are candidates for inclusion in the NRDA AR; and
- Hiring contractor support to develop an AR-focused document repository for the Department and co-Trustees.

In 2013, the Department contracted with Industrial Economics, Inc. (IEc) to commence these activities. During the course of that year, IEc completed and delivered a draft Administrative Record (AR) Process document for Department comment and began developing prototype document-repository web-interface pages and document management system (DMS), an MS Access collection tool. Additionally, a draft decision road-map was created to beta test the prototypes. Meanwhile, the Department initiated the process of organizing Executive Committee documents to create a decision road map with associated supporting documents. Subsequently, the prototype DMS went through several iterations and DOI identified technical groups to provide input for soft launch of the system.

In 2014, IEc helped the Department start working with its technical groups to develop additional AR decision road maps and to identify and organize supporting documents for collection. The Gulf sturgeon was the first resource group addressed. The bird resource group was addressed next. In addition, the Department began regular meetings with NOAA to discuss coordination of AR efforts and development of a joint NOAA/DOI AR Index. Meanwhile, the Department worked with IEc to begin evaluating the appropriate software for document processing. This work is ongoing and will continue through 2015.

As part of its role as Lead Administrative Trustee, the Department is responsible for building and maintaining a publically accessible website for posting AR documents. The current process for posting to the AR is time and resource intensive. In 2015, IEc will be working with the Department to upgrade the website to allow for batch loading of documents and metadata. This will greatly improve efficiency and it will allow for the import of large volumes of AR documents from DOI, NOAA, and other co-Trustees.

Relationship to Other Activities and Data

The AR is publicly accessible and is intended to provide the public with documents considered by the Trustees during the pre-assessment, assessment, and restoration planning phases of the NRDA performed in connection with the Oil Spill. The Department and NOAA are cooperating in developing the public-facing AR but developing their respective portions independently. For example, the Department is responsible for the AR for those resources for which they have primary responsibility including but not limited to birds, turtles, and Gulf sturgeon. The other Trustees are primarily in an “as needed” role. Eventually, all AR documents will funnel into the Department’s public-facing AR.

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Principal Investigators

Department staff involved in this effort include Debora McClain, John Carlucci, Clare Cragan, Holly Deal, Tony Irish, Amy Wisco, Denise Klimas, and Gina Ballard. Key contractor staff associated with this effort include Daniel Hudgens, Neal Etre, and Ann Czerwonka (IEc).

RP Involvement

BPXP funded the initial effort to allow the Department to contract with IEc; however, the Department has not coordinated with BPXP on the development of the AR.

Level of Effort

Total estimated contract costs for this activity are \$1,500,000 with an associated contingency of \$225,000. Oversight and related support will be completed by Department staff identified above, for a total cost of \$575,000, with an associated contingency cost of \$86,250.

6.4. 2015 IPC # 17: Economist Technical Assistance

Purpose and Injury Assessment Need

The Department is conducting a natural resource damage assessment associated with the Oil Spill. Complementing the team of biological staff evaluating natural resource injuries and associated compensatory restoration, economist assistance is needed for scaling restoration projects to the magnitude of the natural resource injuries. The purpose of this IPC activity is to obtain the necessary economist technical assistance that will ensure assumptions and methodologies used are consistent among all of the Department's restoration scaling activities associated with the DWH NRDA case, as well as consistent with the Oil Pollution Act NRDA regulations (15 CFR 990), federal guidance, and Department policy. This IPC activity is relevant to the following trust resource categories for which the Department has the lead in developing the natural resource damages claim: migratory birds, onshore sea turtles, gulf sturgeon, beach mouse, submerged aquatic vegetation within Department lands, and shorelines within Department lands.

Methods

The Department employs a number of intra-agency economists that work on this NRDA; however, as is the case with many aspects of the DWH NRDA, the workload required for this case quickly overwhelms their capacity. The Department thus intends to contract economics expertise to achieve the objective of this IPC activity. This work consists of two main actions: (1) constructing Habitat Equivalency Analysis (HEA) and Resource Equivalency Analysis (REA) models, and (2) preparing associated written reports. The HEA

and REA are models that have foundations in the science of economic valuation of natural resources, and therefore require specialists in the field of economics to ensure proper implementation of these scaling tools. Each HEA is designed for a single specific habitat type, with habitat-specific inputs such as the level and duration of injury experienced by that habitat. Each REA is designed for a single species using species-specific injury information and life history parameters (e.g., normal annual survival rates). A REA can also be designed for a group of species if those species share the same life history parameters. On the restoration credit side, NRDA regulations require that Trustees examine a reasonable range of restoration alternatives for each injury as part of their restoration planning. Each of these restoration alternatives requires at least one HEA/REA to tally the restoration credits. One restoration project could provide benefits to more than one resource, thus requiring more than one HEA/REA to tally the restoration credits from that project.

The HEA/REA work under this IPC activity includes both the injury quantification (debit) and restoration benefits (credit) calculations. For purposes of estimating the most accurate level of effort required for this IPC activity, the Department tallied the debit and credit sides of a HEA/REA calculation as two separate HEAs/REAs. Treating the two sides of an HEA/REA independently allows different combinations of restoration projects to be scaled against the injuries. This facilitates restoration planning and the analysis of restoration alternatives required by the NRDA regulations.

This IPC activity would produce up to 255 HEA/REA models, with the debit and credit sides of an HEA/REA calculation considered as two separate HEA/REA models. The injury information and the biological and ecological information to be used as inputs in the HEAs/REAs will be provided to the contractor by the Department. The reports prepared by contracted economists will document the assumptions and inputs used in constructing the HEAs/REAs and their results.

Relationship to Other Activities and Data

According to the NRDA regulations, restoration alternatives that will be used as the basis for a natural resource damages claim must be scaled so the magnitude of the restoration will make the environment and public whole (15 CFR 990.53(d)(1)). The Department's preferred scaling tool for its trust resources is the HEA/REA approach. Thus, *all* of the Department's injury quantification and restoration benefits data will be subject to scaling in a HEA/REA approach, as appropriate.

Coordination and Implementation

To accomplish this IPC activity, the Department intends to obtain the services of a contractor. The contractor will work with Department injury assessment and restoration

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planning staff across all of the Department's trust resource categories to obtain all necessary HEA/REA input information. Department staff will continue working with their co-Trustee counterparts to finalize any HEA/REA inputs not yet finalized. The Department will provide co-Trustees an opportunity to review and comment on the products of this IPC activity.

Principal Investigators

The Department estimates that this IPC activity will require a team of approximately six contractor staff. The contractor has not yet been selected. This work would produce approximately 255 HEA/REA models, with the debit and credit sides of an HEA/REA calculation considered as two separate HEAs/REAs. Department staff involved in this activity include Veronica Varela, Kevin Reynolds, Andrew Laughland, Bruce Peacock, Heather Best, James Haas, Ashley Mills, Charles Wood, Jon Hemming, Peter Tuttle, Colette Charbonneau, Brian Spears, Clare Cragan, John Rudolph, and John Carlucci.

RP Involvement

If BPXP is willing to fund this activity, the Department is open to a cooperative process if BPXP wishes to participate.

Level of Effort

Total estimated contract costs for this activity are \$762,076 with an associated contingency of \$114,311. Oversight and related support will be completed by Department staff identified above, for a total cost of \$65,000, with an associated contingency cost of \$9,750.

6.5. 6.5 2015 IPC #18: Expert Statistical Support

Purpose and Injury Assessment Need

The Department leads several areas of the DWH NRDA (e.g., birds, sand beach, response information, onshore sea turtles, Gulf sturgeon, etc.). Numerous individual field and analytical work plans have been developed and are continuing to be developed as part of the ongoing NRDA. In addition, analyses and interpretation of data collected through individual Department-led NRDA assessments are being generated. These assessment activities generate a large quantity of data collected across space and time that will be used for quantifying injury to a number of Department trust resources. Appropriate, accurate, and consistent statistical analyses of these data are essential. Many of our data sets will benefit from additional technical and/or expert statistical analyses beyond that provided by the various principal investigators and study leads. Case-wide consistency in statistical analysis methods and practices is of the utmost importance in producing an accurate and defensible injury claim.

Methods

The Department intends to contract statistical expertise to achieve the objective of this IPC activity. The goal of this activity is to provide technical statistical support, expertise and advice through analysis of data generated by various assessment activities as part of the DWH NRDA. The contractor will work with Department and/or various principal investigators, to accomplish the tasks identified. The Department will identify and articulate the statistical needs of our various data sets, and the contractor will perform statistical analysis and report results on specified data sets. Department data sets are in various stages of completeness. Data have been collected over multiple years and many data are still in the process of being either collected or validated and verified through appropriate Quality Assurance/Quality Control processes.

Relationship to Other Activities and Data

This activity incorporates statistical support for specific assessment data generated through Department-led DWH NRDA work plans and is relevant to the following Department trust resource categories: birds, onshore sea turtles, Gulf sturgeon, beach mouse, submerged aquatic vegetation within Department lands, and shorelines within Department lands.

RP Involvement

BPXP's involvement in this activity would be minimal.

Principal Investigators

Department staff involved in this activity include Kevin Reynolds, Veronica Varela, Glenn Constant, Charles Wood, Ashley Mills, Clare Cragan and John Rudolph. The contractor for this activity has not yet been selected.

Level of Effort

Total estimated contract costs for this activity are \$125,000 with an associated contingency of \$18,750. Oversight and related support will be completed by Department staff identified above, for a total cost of \$35,000, with an associated contingency cost of \$5,250.

6.6. 2015 IPC #19: Aerial Imagery

The Aerial Imagery (AI) technical team coordinates aerial and satellite imagery, remote sensing, and mapping to support and assist the various natural resource technical team, and other activities in the ongoing DWH NRDA. Functions of the AI technical team include: determining and responding to the needs of the other technical teams, acquiring imagery identified by the Trustees to be useful for the NRDA, interpreting coastal habitats,

coordinating geospatial capabilities and needs with the other technical teams, and making aerial imagery and mapping data available.

Since the Incident began, the Trustees have analyzed remote sensing data from several satellite-mounted sensors as well as high-resolution remote sensing data from airplane-mounted sensors to determine extent and thickness of oil on the ocean during the Oil Spill. The Trustees are utilizing Airborne Visible and InfraRed Imaging Spectrometer (AVIRIS) hyperspectral remote sensing data to assess the volume of surface oil related to the Oil Spill on days when surface conditions (e.g., wind, waves, and sun angle) permit quantitative estimates. AVIRIS oil volume estimates derived from a spectral shape-matching system called Tetracorder can be used to extrapolate the density of oil on a per pixel basis to concurrent broad band visible satellite images that provide a more synoptic view of the Oil Spill. Values of the average oil volume/unit area for thick oil and sheens can be used to extrapolate to similar areas of thick oil and sheens not covered by AVIRIS on contemporaneous satellite/airborne images for selected days with the goal of providing synoptic quantitative oil volume inputs for ocean hydrodynamic models. Work on this activity is ongoing in 2015.

Methods

In 2015, activities conducted by Department staff as part of the offshore oil volume AVIRIS assessment project include:

A new version of Tetracorder imaging spectroscopy analysis and mapping software that was developed in 2014 is being tested, and then applied in 2015.

The radiative transfer modeling software (radtran that is used to compute spectral response as a function of composition and scattering conditions, which was upgraded to enable modeling of oil emulsions in 2014, is being tested and then applied in 2015.

Spectral viewing software (SPV) which is not commercial available was under development in 2014 and will be completed and used in 2015. This software can rapidly display and overly image mapping products from imaging spectroscopy data that show the intensity range of derived abundances overlaid on an image base and with the ability to extract spectroscopy data in complex patterns to evaluate mapping results.

Relationship to Other Activities and Data

NOAA is leading the collection and analysis of remote sensing data to determine the extent and thickness of oil on the ocean surface as a result of the Oil Spill. The Department is providing expert technical staff and management coordination to assist with this effort.

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Deliverables Produced

The estimation of offshore surface oil volume with AVIRIS will result in four major deliverables: 1) the selection and preparation of relevant AVIRIS data, 2) the synthesis of water-in-oil emulsions for spectral mapping, 3) the development of a radiative transfer model for mapping oil thickness, and 4) a Tetracorder mapping of AVIRIS data to derive oil volumes. Data collection and monitoring for this assessment were conducted in 2014. Department staff are working with NOAA on this effort. The Department is requesting funding to enable Department staff to continue assisting NOAA with this effort.

Principal Investigators

The DOI staff involved in aerial imagery efforts includes Gregg Swayze, Eric Livius, Heather Lowers, Chad Alles, Kevin Reynolds, John Rudolph, and Bill Jones.

RP Involvement

BPXP funded much of the aerial imagery work and was very involved in the early stages of the project through meetings and conference calls. Additionally, the development of the original aerial imagery plan was a joint cooperative effort between the Trustee's and BPXP. However, the AVIRIS work plan was developed independently of BPXP.

Administrative Record

The Department team will continue to respond to requests for documents to complete the administrative record. This activity will include providing new documents and data related to fieldwork and/or analyses, and preparation of the draft DARP. The costs of the Department team in gathering and providing these records for Administrative Record purposes is captured here; the costs of capturing and processing these records for Administrative Record purposes is captured under the Administrative Record Tasks, Activity #16 in the Claim.

Level of Effort

This activity will be completed by Department staff identified above, for a total cost of \$625,000, with an associated contingency cost of \$93,750.

7. Restoration Planning

7.1. 2015 IPC #20 Damage Assessment and Restoration Plan (DARP) and Programmatic Environmental Impact Statement (PEIS), and Associated Regulatory Compliance

Purpose and Assessment Need

While NOAA is broadly managing development of the DARP and PEIS, the Department is playing a significant role in the effort by helping to lead several of the DARP-associated sub-teams. The sub-teams are developing restoration techniques, benefit scaling, and cost estimates for implementation restoration efforts that will be the basis of the Trustees claim of liability against the Responsible Party. The Department-led sub-teams include: 1) restoration of avian injuries, 2) restoration of injuries to nesting sea turtles, 3) restoration of federal lands injured, 4) restoration of federally-listed threatened and endangered species other than sea turtles (i.e., several species of beach mouse, Gulf sturgeon and potentially state-listed species such as the terrapin), and 5) the beaches and barrier islands sub-team, which is considering restoration of response injury to those habitats.

In addition to leading several teams, Department personnel have specific expertise that is required on the NOAA-led restoration sub-teams. The Department currently has staff participating on restoration planning activities for marsh restoration and lost human use, who provide input from Department personnel working on the injury assessment and experience/knowledge from relevant Department subject matter experts.

The Department is also the lead for several injury assessment categories including: 1) avian resources, 2) endangered or threatened species including sea turtles (the Department leads efforts to assess injuries to nesting sea turtles; NOAA leads efforts to assess injuries to juvenile and adult sea turtles), 3) Alabama and Florida beach mice and Gulf sturgeon, 4) DOI managed lands and facilities, and 5) sand beach response injury. In 2015, the Department assessment teams will be transitioning from conducting assessment studies to injury quantification and development of DARP-specific information and DARP-specific content. Examples include study summaries, descriptions of nature and extent of injuries resulting from the Oil Spill, and injury scaling. This information will be included within injury assessment portions of the DARP to document injuries and provide important data and analysis for restoration scaling and planning. The Department will have a number of Agency staff working on this effort and will also require contractor support. Contractor support will ensure an organized and connected presentation of injury information that will be uniform to NOAA-led chapters of the DARP.

NOAA has managed the review and oversight of the DARP and PEIS by using different layers of management. The Restoration Planning Team provides review and direction to the restoration sub-teams while the Trustee Management Team provides policy direction to the entire process. Similar to NOAA managers, Department managers are participating in the oversight and leadership of the injury volume of the DARP to ensure that DOI sections and chapters meet the requirements of the regulations. Department staff are engaged at all levels in the development of the DARP and PEIS for the *Deepwater Horizon* case.

Department staff will be providing input and oversight into the development of the DARP and will continue until the draft plan is ready for public review and comment. Department staff have specialized experience and expertise and will integrate NEPA and Council on Environmental Quality regulations into the development of the OPA-based DARP, as well as compliance with federal laws. In addition, the Department expects to take a lead role in these evaluations for resource areas for which the Department has management authority, including but not necessarily limited threatened and endangered species, cultural and historic resources and various coastal barrier resources.

As the assessment lead for several injury categories listed above, the Department interacts with its fellow Trustees to document injuries. This coordination will include organizing calls and meetings as information becomes available for discussion and review. The Department is also the lead for four of the DARP restoration sub-teams. This responsibility requires organizing and facilitating weekly calls with the Trustees, and participating in weekly discussions with the other sub-team leads to ensure work integrated to the greatest extent possible.

Relationship to Other Activities and Data

Trustee coordination for DARP injury assessment information will go above and beyond coordination that is described for the specific studies outlined in this IPC. The development of the DARP injury assessment information will be the next step after injury reports are drafted and finalized as appendices to the DARP. Relevant information and data developed as part of the DARP will be incorporated into the administrative record and data management systems.

Methods

Developing DARP chapters, appendices and other supporting documentation, along with holistic document review will require extensive Department staff time in 2015. Weekly calls will be necessary to keep all Department bureaus up to date as well as provide focus for reviews and input needed. The Department will participate on all coordination calls with NOAA and the other co-Trustees. Department staff will provide legal, economic, biological,

ecological, archaeological, NEPA, and other compliance support for the Department-led DARP chapters and for the DARP in its entirety. In 2015, the Department and its contractors will support the continued development of the DARP by completing the actions listed below.

- Provide outlines for the DARP injury assessment sections lead by DOI;
- For DOI-lead injury assessment information, produce injury assessment sections for DARP chapters, appendices and other supporting documentation;
- Complete the restoration options screening process to include restoration techniques tables agreed to by all Trustees;
- Develop scaling approaches for screened restoration options for injured Department trust resources;
- Develop reports that will record key aspects of the work conducted for DARP decision support and chapter development;
- Organize and facilitate weekly calls with the Trustees for four of the DARP restoration sub-teams and participate in discussions with the other sub-team leads weekly to make sure work is as integrated as possible;
- For Department trust resources, produce restoration planning sections for DARP chapters, appendices and other supporting documentation; and
- Review and comment on drafts of DARP materials developed by other Trustees, and participate in planning, coordination and DARP development calls, meetings and related processes.

Principal Investigators

The Department staff involved in the injury assessment and restoration planning for the DARP include James Haas, Bruce Peacock, Lynne Koontz, Alyssa Dausman, Michelle Meyers, Gregg Steyer, Amy Mathis, Mark VanMouwerik, James Chapman, Colette Charbonneau, Benjamin Frater, Erin Chandler, Andrew Laughland, Ashley Mills, Robin Renn, Brian Spears, Charles Wood, Jarrett Woodrow, Dan Audet, Kevin Reynolds, Holly Blalock-Herod, John Rudolph, Jon Hemming, Pete Tuttle, Daniel Esler, and Holly Deal. Key IEC contractor staff associated with injury assessment and restoration planning efforts include Andrew Schwarz, Michael Donlan, Jim Dwyer, Nadia Martin, Dr. Ann Jones, Alexandra van Geel, Alexandra Bothner, Meredith Amend, Michael Berger and Nicole Thompson.

RP Involvement

BPXP is not currently involved in the development of the Trustee DARP and PEIS.

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Administrative Record

The Department team will continue to respond to requests for documents to complete the Administrative Record. This activity will include providing new documents and data related to fieldwork and/or analyses, and preparation of the draft DARP. The costs of the Department team in gathering and providing these records for Administrative Record purposes is captured here; the costs of capturing and processing these records for Administrative Record purposes is captured under the Administrative Record Task #16.

Level of Effort

Total estimated contract costs for this activity are \$1,500,000 with an associated contingency of \$225,000. Oversight and related support will be completed by Department staff identified above, for a total cost of \$1,150,000, with an associated contingency cost of \$172,500.

8. Coordination, Oversight, Implementation, and Analysis

8.1. 2015 IPC # 21: DOI Injury Assessment, Restoration Planning, and Case Management

Purpose

This activity includes Incident-wide case management and administration costs for the Department. The Department FTEs are program or regional managers that are dedicated for a significant period of time to the Oil Spill, or are staff assigned full-time to lead large areas of the Department's assessment activities at the technical and management level. Tasks include participation in Executive Council and Trustee Council subcommittees, budget and financial work, public affairs and communication, administrative support functions, contract management, and other overall case management. This activity also includes the Department's operational costs. In this Claim, Department staff efforts related to particular injury assessment are described and accounted for under the specific sections above.

Deliverables Produced

The NRDA activities related to this procedure are management- and administration-oriented, and thus technical deliverables will not be produced.

Principal Investigators

Senior Department staff involved in Case-wide management and administration efforts and not mentioned elsewhere in this Claim are Cynthia Dohner and Bob Dreher. Other Department staff involved in Case-wide management and administration efforts and not

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mentioned elsewhere in this Claim are Lori Buitink, Dennis Hardy, Brenda Turrentine, Mary Heberts, Beth Wilson, Julia Towns, Melissa Chavis, James Quade, Monica Vigil, Teresa Watson, Nancy Werdel, Albert Kagler, Cara Leigh Collins, Helen Hammergren, Artela Jacobs, Nanciann Regalado, Pamela Rule, Teresa Ward, Deborah Warren, Amy Wisco, Charman Cupit, Lisa Morrow, Kim Crutchfield, Craig Conzelmann, John Barras, Chris Swarzenski, Soupy Dalyander, Joseph Long, Guthrie Zimmerman, Faye Winters, and Tyrone Santos. Department attorneys involved in case management are John Carlucci, John Rudolph, Holly Deal, Clare Cragan, Mary Lynn Taylor, Hilary Tompkins, Vanessa Ray-Hodges, and Mariagrazia Caminiti.

RP Involvement

Coordination with BPXP occurs on an as needed basis related to Trustee coordination meetings and funding issues.

Level of Effort

This activity will be completed by the Department, for a total cost of \$3,315,873, with an associated contingency cost of \$497,381. Total estimated contract costs for this activity are \$200,000 with an associated contingency of \$30,000.