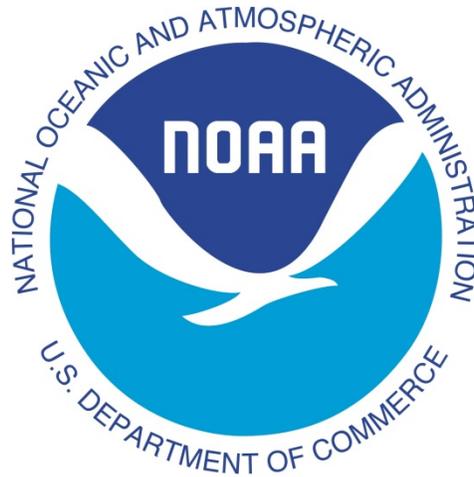


NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION

Sixth Interim, Partial Claim for Assessment and Restoration Planning Costs

20 April 2010 Deepwater Horizon (MC252) Incident



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LIST OF ACRONYMS AND ABBREVIATIONS

Acronym	Definition
AR	Administrative Record
AVIRIS	Airborne Visible/Infrared Imaging Spectroradiometer
BP	British Exploration and Production, Inc.
Claim	Sixth Interim, Partial Claim for Assessment and Restoration Planning Costs
CY	Calendar year
DARP	Damage Assessment and Restoration Plan
DIVER	Data Integration, Visualization, Exploration, and Reporting
DMT	Data Management Team
DOC	Department of Commerce
DOI	U.S. Department of the Interior
DOSS	Diocetyl sodium sulfosuccinate
DWH	Deepwater Horizon
ECMS	Electronic Content Management System
EPA	Environmental Protection Agency
ERMA	Environmental Response Management Application
Field Ops	Field Operations Team
FTE	Full time equivalent
FY	Fiscal year
GPS	Global Positioning System
IEc	Industrial Economics, Incorporated
Incident	Deepwater Horizon oil spill
IPC	Interim Partial Claim
MC252	Deepwater Horizon/Mississippi Canyon 252
MMPA	Marine Mammal Protection Act
MMSN	Marine Mammal Stranding Network
MODIS	Moderate Resolution Imaging Spectrometer
NEPA	National Environmental Policy Act
NMFS	National Marine Fisheries Service
NOAA	National Oceanic and Atmospheric Administration
Notice	Notice of Intent to Conduct Restoration Planning
NPFC	National Pollution Funds Center
NRDA	Natural Resource Damage Assessment

OPA	Oil Pollution Act
OPR	Office of Protected Resources
PAH	Polycyclic aromatic hydrocarbon
PEIS	Programmatic Environmental Impact Statement
PI	Principal Investigator
QA/QC	Quality Assurance/Quality Control
QC	Quality Control
RP	Responsible Parties
RPT	Restoration Planning Team
SAR	Synthetic aperture radar
SEFSC	Southeast Fisheries Science Center
TWG	Technical Working Group
UME	Unusual mortality event

EXECUTIVE SUMMARY

On April 20, 2010, an explosion and fire on the Deepwater Horizon (DWH) 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., 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 for restoration of such injured resources.

Immediately following the Deepwater Horizon/Mississippi Canyon 252 (MC252) Oil Spill, the affected Trustees initiated joint efforts to begin the collection and analysis of: (1) data reasonably expected to be necessary to make a determination of jurisdiction or a determination to conduct restoration planning; (2) ephemeral data; and (3) information needed to design or implement anticipated emergency restoration and assessment activities as part of the Restoration Planning Phase. In addition, pursuant to Natural Resource Damage Assessment (NRDA) regulations (15 CFR § 990.14), one of the identified Responsible Parties (RPs), BP Exploration and Production, Inc. “BP”, informed the Trustees of its intent to participate in the NRDA. As a result, the Trustees provided opportunities for BP to comment on Trustee-developed assessment plans and to participate in field work when the Trustees and BP reached a mutual agreement. As a condition of participation, BP is required to fund the joint plans. In this Sixth Interim, Partial Claim for Assessment and Restoration Planning Costs (Claim), the *Deepwater Horizon/MC252 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.

Pursuant to the NRDA regulations applicable to OPA, 15 C.F.R. Part 990 (NRDA regulations), the Trustees issued a Notice of Intent to Conduct Restoration Planning (Notice). That Notice confirmed the Trustees were ready to proceed with restoration planning to fully evaluate, assess, and quantify and develop plans for restoring, replacing or acquiring the equivalent of natural resources and their services injured by and losses resulting from the Incident. The restoration planning process will include collection of information that the Trustees determine is appropriate for identifying and quantifying natural resource injuries and associated losses of resources and their services, and determination of the need for, and type and scale of restoration actions.

This Claim document identifies assessment and restoration planning activities, including studies, that the U.S. Department of Commerce (DOC), National Oceanic and Atmospheric Administration (NOAA) plans to implement to inform injury determination, injury quantification, and restoration selection activities associated with the Incident. The collection of activities identified in this 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 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). NOAA also will be evaluating injury assessment and restoration planning and implementation records for inclusion into Administrative Record(s) (§990.61). Scientific information to support injury determination

and quantification, although incomplete, is sufficient for the Trustees to proceed with restoration planning. NOAA assessment and restoration planning activities in this Claim are a subset of the NRDA activities conducted by all Trustees. NOAA activities in this Claim focus on affected natural resources that NOAA directly manages – including coastal habitats, fisheries, marine mammals and sea turtles, endangered and threatened marine species, and resources associated with National Estuarine Research Reserves and National Marine Sanctuaries. NOAA reserves its ability to supplement the assessment and restoration planning procedures identified herein.

This Claim covers NOAA’s assessment and restoration planning activities and estimated costs that are unique from activities already paid for by BP or the National Pollution Funds Center, or contained in our recent demands on October 3, 2014 and October 30, 2014. The document is organized to provide a description of NOAA’s proposed activities and associated expenditures by resource category or major topic area. NOAA requests a total of \$84.46M to complete NRDA activities that result in a public review version of the Damage Assessment and Restoration Plan (DARP). NOAA is not requesting contingency funding for any of the activities.

The requested funds for procedures in this Claim are additional to monies provided by the National Pollution Funds Center (NPFC) in summer 2012 for Interim, Partial Claim for Assessment and Restoration Planning Costs (IPC) #N10036-OCO8. On July 5, 2012, The NPFC provided \$19.4M in a partial adjudication of NOAA’s IPC submitted on March 23, 2012. About three weeks later on July 27, 2012, the NPFC adjudicated the remaining portion of NOAA’s first Interim, Partial Claim for Assessment and Restoration Planning Costs for assessment and restoration planning. The NPFC provided \$103.1M to NOAA in 2012 for all procedures that were originally scheduled for April-December 2012. In early 2014, the NPFC provided \$123.9M for NOAA to complete approved procedures in calendar year (CY) 2014. In addition to these claims for ecological assessment and restoration planning, NOAA submitted separate claims for lost human use assessment costs on November 9, 2011, May 4, 2012, and July 27, 2012 to the RPs to address these activities.

On October 3, 2014, we sent a claim for assessment and restoration planning procedures that is narrowly focused on the writing, coordination, and preparation necessary to incorporate certain technical elements into required, draft documentation associated with the Incident (e.g., a draft Damage Assessment and Restoration Plan [DARP] prepared by Trustees). On October 30, 2014, we sent a claim that identifies NOAA’s pre-stipulation Early Restoration planning costs for developing projects with the remaining Early Restoration Framework Agreement funds and NOAA’s costs for executing its trustee oversight responsibilities for post-stipulation Early Restoration program implementation, in accordance with our obligations as an OPA trustee (33 U.S.C. § 2706). This funding request is additive and completely distinct from the two claims sent to you in October 2014. This claim is focused on the activities necessary to complete and deliver a full set of technical material in a public review draft of the Damage Assessment and Restoration Plan.

In total, NOAA requests a sum certain of \$84,462,300 for injury assessment and restoration planning activities specified in this Claim. Please refer to Table 1 and Table 2 for further details.

Table 1. Summary of contract costs and contract labor effort by injury assessment and restoration activity.

Activity	Sum of Total Contract Costs	Sum of FTE Equivalent ¹
Benthic Oil Injury Footprint around Macondo Wellhead	\$1,490,000	7.5
Mesophotic Reefs	\$412,300	1.3
Transport, Fate, and Effects Modeling	\$296,900	0.8
Fish and Plankton	\$7,545,700	14.9
Aquatic Sea Turtle Injury Quantification	\$1,066,500	2.9
Estuarine and Coastal Dolphins	\$1,301,200	3.0
Coastal and Estuarine Cetacean Strandings	\$2,084,800	3.2
Oceanic Marine Mammals	\$339,200	0.9
Completion of Shoreline Injury Quantification	\$382,100	1.0
Continued Assessment of Subtidal Oyster Injury (Abundance and Biomass)	\$3,779,300	10.1
Continued Assessment of Subtidal Oyster Injury (Recruitment)	\$7,094,900	22.3
Continued Assessment and Analysis of Nearshore Oyster Injury	\$5,725,800	17.7
Completion of Oyster Injury Quantification	\$286,200	0.7
Lost Human Use	\$3,149,200	12.7
Completing Toxicity Assessment for Aquatic Organisms	\$2,209,000	10.1
Chemistry: Analysis, Interpretation, Integration into Exposure Assessment	\$3,405,900	10.0
Data Management: Infrastructure and Data Update Process	\$7,178,200	22.1
Data Management: Address End User System/Tool Needs	\$1,668,600	4.8
Data Management: File Integration / Server Consolidation / Long-Term Archive	\$896,100	2.4
Injury Assessment and Legal Case Management	\$1,950,900	9.5
Deepwater Horizon Electronic Content Management System and Oil Pollution Act Administrative Record	\$1,939,600	5.8
Restoration Planning Activities	\$9,067,900	33.1
Grand Total	\$63,270,300	196.8

¹ Full-Time Equivalents (FTE) are based on approximate measurements of work effort per year and are only specified to provide an understanding of the magnitude of labor associated with the total costs.

Table 2. Summary of agency costs and agency labor effort by injury assessment and restoration activity.

Activity	Sum of Total Agency Costs	Sum of FTE Equivalent ²
Benthic Oil Injury Footprint around Macondo Wellhead	\$359,500	1.3
Mesophotic Reefs	\$163,100	0.6
Transport, Fate, and Effects Modeling	\$623,000	2.2
Fish and Plankton	\$1,041,300	3.8
Aquatic Sea Turtle Injury Quantification	\$480,100	1.7
Estuarine and Coastal Dolphins	\$1,294,700	4.2
Coastal and Estuarine Cetacean Strandings	\$499,500	1.1
Oceanic Marine Mammals	\$257,500	0.9
Completion of Shoreline Injury Quantification	\$519,000	1.9
Continued Assessment of Subtidal Oyster Injury (Abundance and Biomass)	\$70,800	0.3
Continued Assessment of Subtidal Oyster Injury (Recruitment)	\$129,200	0.6
Continued Assessment and Analysis of Nearshore Oyster Injury	\$99,700	0.5
Completion of Oyster Injury Quantification	\$345,900	1.3
Lost Human Use	\$1,722,800	2.6
Completing Toxicity Assessment for Aquatic Organisms	\$605,300	2.1
Chemistry: Analysis, Interpretation, Integration into Exposure Assessment	\$52,400	0.2
Data Management: Infrastructure and Data Update Process	\$730,300	2.6
Data Management: Address End User System/Tool Needs	\$48,400	0.2
Data Management: File Integration / Server Consolidation / Long-Term Archive	\$145,200	0.6
Injury Assessment and Legal Case Management	\$3,217,300	10.6
Deepwater Horizon Electronic Content Management System and Oil Pollution Act Administrative Record	\$1,442,200	5.5
Restoration Planning Activities	\$7,344,800	20.9
Grand Total	\$21,192,000	65.7

² Full-Time Equivalents (FTE) are based on approximate measurements of work effort per year and are only specified to provide an understanding of the magnitude of labor associated with the total costs.

Claimant eligibility

The following entities are designated natural resource Trustees under OPA and are acting as Trustees for this Incident:

- The NOAA, on behalf of the DOC;
- the U.S. Department of Interior (DOI), as represented by the National Park Service, United States Fish and Wildlife Service, Bureau of Indian Affairs, and Bureau of Land Management;
- the Environmental Protection Agency (EPA);
- the U.S. Department of Agriculture;
- the U.S. Department of Defense;
- 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;
- the State of Mississippi's Department of Environmental Quality;
- the State of Alabama's Department of Conservation and Natural Resources and Geological Survey of Alabama;
- the State of Florida's Department of Environmental Protection; and Florida Fish and Wildlife Conservation Commission; and
- the State of Texas' Parks and Wildlife Department, General Land Office, and Commission on Environmental Quality.

In addition to acting as Trustees for this Incident, the States of Louisiana, Mississippi, Alabama, Florida 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: 10 1 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 49-17-43; and Alabama Code § § 9-2-1 et seq. and 9-4-1 et seq.

These Trustees may be potential claimants for the same natural resources damaged (33 CFR §136.209 (c)).

Co-Trustee Coordination

NOAA coordinates regularly with all the Trustees on the collection and interpretation of injury assessment data described in NRDA work plans. We also coordinate with Trustees on all aspects of restoration planning. In 2014 for injury assessment, a large focus of NOAA's Interim, Partial Claim for Assessment and Restoration Planning Costs was the preparation of draft technical reports that summarize injury findings in many of the major resource/habitat areas affected by the oil spill. These preliminary summaries of injury findings are necessary for us to discuss injury quantification approaches with Trustees that account for different types of documented injuries across resources and habitats, and spatial, temporal, and trophic scales. The process-oriented limitation of these initial technical summaries is that each "report" is necessarily focused on data in a narrow topic area (e.g., oyster larvae recruitment from

long-term assessment monitoring at stations across Northern Gulf of Mexico). Our initial presentations of injury findings are not always in the form that might accompany a final restoration plan(s) for the Incident or reflect full Trustee consensus. Although we will present achievements in each of the funded activities per the NPFC's requirement for annual progress reports, and are in constant communication with co-Trustees about important findings, we have to expend more effort to reach final NRDA documentation milestones.

In this Claim, funds are requested to undertake critical field, analytical, and desktop injury assessment analyses necessary for the preparation of a public review draft of the DARP and other associated technical documents. Similar to other IPCs, we will have a multi-pronged focus to our co-Trustee coordination. Several tasks are critical in this Claim:

1. Undertake field activities needed to quantify injuries from the Incident;
2. Conduct desktop analyses, laboratory and sample analyses, and associated documentation to quantify injuries from the Incident. Data for all injury proxies and from our injury analyses will be integrated in a high-level, ecosystem scale description of injuries that is ready for public review;
3. Develop and evaluate compensatory restoration projects;
4. Develop technical documents that will support the comprehensive restoration plan(s) for the NRDA; and
5. Evaluate technical records for inclusion into the Administrative Record (AR).

In summary, a desired milestone for funding from this Claim is to record all relevant technical findings and restoration planning analyses into a public review draft of the DARP. This is different and more advanced than the milestone specified for certain assessment activities in our Fourth IPC dated October 3, 2014, which was to undertake a process of Trustee review on technical findings and restoration analyses to be included in the draft DARP (see Attachment A-1). We will coordinate with Trustees through the Trustee Council and regularly scheduled calls on technical topics. As appropriate, we also will consider data and technical information transmitted from BP.

Uncertainty of Co-Trustee Interactions

As we put together this Claim, we identified many variables outside of NOAA's control. Thus, predicting the exact timetable for a series of major Trustee deliverables for the public is difficult. The two most important aspects of timetable uncertainty are the scientific complexity and ongoing nature of this NRDA. The effects from this Spill of National Significance are ecosystem-wide in the Northern Gulf of Mexico. The final restoration plan(s) will be equally complex to account for the many types of ecological and human services lost from the Incident. Several other uncertainty factors were identified:

- Amount of labor time with co-Trustees needed to review, manipulate, and/or interpret 10+ terabytes of BP-delivered data and documents delivered to us in hard-to-handle formats (e.g., large amounts of data in .pdf format). Our 2014 costs paid by the NPFC did not include a full evaluation of this information because we did not have an inventory of what information BP was going to transmit (A list of data types is provided in Attachment A-2);

- We cannot anticipate the number, type, or content of questions from co-Trustees on numerous injury quantification evaluations, either in their initial technical form or in refined forms that reflect Trustee consensus and connections with yet-to-be-written planning documents;
- We cannot anticipate the number, type, or content of requests for NOAA scientists to perform data re-analysis or interpretation based on co-Trustee questions;
- Provisional nature of integrating injury quantification results into a Gulf-wide package of compensatory restoration types/projects that has yet to be determined; and
- We cannot fully anticipate the co-Trustee needs for injury assessment data delivery or the NOAA-led manipulation of large volumes of data to support their technical documentation needs.

Although we cannot fully anticipate what the other co-Trustee injury assessment and restoration planning needs will be, all Trustees are active at the Trustee Council level and each agency’s scientists are collaborating at every level. We strongly believe our work is complementary and not duplicative of co-Trustee evaluations of injury assessment and restoration planning activities. Under the Interim Claims regulations 33 CFR §136.207 (b), “claims for uncompensated natural resource damages may be presented by an appropriate natural resource Trustee”. We are presenting a sum certain for NOAA to quantify ongoing injury to oysters and marine mammals in the field, complete all laboratory and sample analyses and injury assessment evaluations associated with a draft restoration plan, write a detailed DARP ready for public review, plan for early restoration projects, and prepare a large restoration planning document(s) with significant assistance by other Trustees. Funds for these activities are needed for NOAA to fulfill its Trustee obligations under OPA and all appropriate laws and regulations, and all of these activities require co-Trustee coordination. All of our presented activities are consistent with the six factors in 33 CFR §136.209, Proof for Natural Resources Claims.

Co-Trustee Use of Funding and BP Funding Interactions

Proposed injury quantification work for offshore aquatic habitat and resource investigations is planned to be implemented by NOAA and DOI scientists. Expenses incurred in this procedure may occur from NOAA or DOI personnel.

All funds received by NOAA previously from BP have not been applied to any of the proposed activities in this Claim.

Responsible Party Information

The RPs identified for this Incident thus far are BP; Transocean Holdings Inc.; Triton Asset Leasing GmbH; Transocean Offshore Deepwater Drilling Inc.; Transocean Deepwater Inc.; Anadarko Petroleum; Anadarko E&P Company LP; and MOEX Offshore 2007 LLC. Pursuant to 15 CFR § 990.14(c), concurrent with the publication of the Notice to Conduct Restoration Planning, the Trustees invited the RPs identified above to participate in a NRDA. The Trustees have coordinated with BP, the only RP who accepted this invitation to actively participate in the NRDA process. When the term “Responsible Party” or “RP” (in the singular form) is used in the remainder of this document, it refers to BP.

Determination of Jurisdiction

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

Time Limitations on Claims

This Claim is for funding of reasonably necessary assessment and restoration planning procedures to inform Incident- specific analyses. This Claim is presented in writing to the Director, NPFC within time limits specified in 33 C.F.R. §136. 101. The NRDA for this Incident is not complete.

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 Court has not scheduled the trial for the natural resources damages claim.

Claim Presentation

This Claim has been presented for a sum certain, in accordance with the OPA to all of the identified RPs by letters dated January 15, 2015.

NOAA certifies the accuracy and integrity of this Claim and certifies that any actions taken or proposed were or will be conducted in accordance with the OPA and consistent with all applicable laws and regulations.

NOAA certifies our assessment was conducted in accordance with applicable provisions of the natural resources damage assessments regulations promulgated under section 1006(e)(1) of the OPA (33 U.S.C. 2706(e)(1)).

NOAA certifies that, to the best of our knowledge and belief, payment of any subpart of the claim presented would not constitute a double recovery for the same natural resources damages.

Overview of Assessment Approach

This Claim presents a sum certain for NOAA to complete a public review draft of the DARP, including the numerous injury assessment sections of the DARP that will underpin our assertions about injuries to natural resources and the types and amounts of restoration needed. In support of that milestone, we are requesting funds to conduct assessment fieldwork in two resource areas where injuries from discharged oil are still occurring – marine mammal and oyster communities across the Northern Gulf of Mexico. The rest of our assessment work is new desktop analysis or laboratory and sample analysis for injury quantification in many of the resource categories and activities described in previous IPCs. Our quantification analysis is nearing completion, so we have fewer assessment activities compared to previous years. However, the scope and type of data management needs for assessment are projected to

remain similar to past years, even as we transition to a DARP milestone that is restoration-focused. Data management is discussed in more detail later in this section.

With 2014 funds, the Principal Investigators (PIs) and our assessment team (includes data management personnel) are preparing draft/final technical reports, technical summaries of data that may be used regulatory documents, and injury quantification analyses. The draft/final PI-led technical reports will contain information related to injury determination, quantification, and, if appropriate, time to natural recovery without restoration, but may not be in a format suitable to connect findings to restoration scaling, alternatives evaluation, and overall restoration planning.

Previous injury assessment funding requests have been focused on *analysis* milestones related to completing fieldwork, laboratory analyses, desktop assessment and quantification analyses, and technical summaries of data and/or PI-led technical reports [NOAA's Third IPC]. For selected resource areas, we requested funds for contract support staff to help us meet our next *documentation* milestone; that is, prepare draft technical sections of the DARP for co-Trustee review and comment [NOAA's Fourth IPC]. We also requested funds in the Fourth IPC to meet appropriate requirements for disposal, storage, and/or long-term archive of carcasses and samples.

With requested funds in this Claim and using information from all of the assessment activities, we will finalize a DARP injury assessment chapter *for public review*. This advanced documentation milestone requires significant effort by agency staff and contractors. The DARP assessment chapter will be comprehensive and include all assessment information necessary to document injuries and support the evaluation of restoration alternatives, restoration scaling, restoration plans, and project objectives and monitoring provided in the DARP (15 CFR – Subpart E, Restoration Planning Phase [§ 990.53 to § 990.55]). For specific activities in this Claim, we briefly describe how they are different from the 4th IPC with respect to technical documentation (Attachment A-1).

Similar to previous years, we envision significant interaction with co-Trustees. The complexity of the NRDA and our agency's role among the Trustees prompted us to consider many factors as we developed our assessment budget needs. NOAA staff and contractors were the leads for implementing more than 100 NRDA studies on injured resources. The final signed work plans have been shared in previous IPCs but are summarized again in Attachment A-3. Updated or new signed work plans since October 30, 2013 are included in Attachment A-4. Because of that assessment footprint, many of our agency staff and contractors also are leading the development of technical reports and appendices that likely will be tethered to the DARP or entered into the AR, as appropriate [15 CFR, Subpart D-Preassessment Phase § 990.45]. We budgeted labor costs in each assessment procedure to ensure NOAA can coordinate with co-Trustees on data, products, reports, and the assessment portions of the DARP. More specifically, we envisioned these general types of interactions:

- co-Trustee comments we might receive on draft/final technical reports and supporting documents in each major resource area (i.e., peer review);
- co-Trustee requests for delivery of interpretive results or parcels of data necessary for injury quantification and scaling;
- co-Trustee requests for NOAA agency staff or contractors to re-run technical analyses after their agency review and interpretive discussions; and

- Focused co-Trustee discussions on restoration scaling or habitat/resource recovery using DWH assessment information.

We also budgeted effort in each procedure to evaluate large volumes of data transmitted from BP to the U.S. Government in summer 2014 (Attachment A-2). A portion of this data package is RP-collected assessment data that was not originally shared with NOAA or Trustees. All of the transmitted data will be evaluated to some degree by our PIs and agency scientists.

NOAA determined that the assessment procedures identified in this document meet the requirements set forth in the OPA regulations, and are integrated with and not duplicative of co-Trustee NRDA data collection and analysis activities. Modifications to the identified assessment procedures may be made because of the participation of BP in the NRDA pursuant to 15 CFR § 990.14. A description of each assessment activity's purpose and related implementation information is provided in subsequent sections of this document, and in some cases, in the related work plans. Additional budget detail or information about the proposed activities can be provided upon request.

NOAA regularly posts final NRDA work plans and study-related data on the Internet. For the official record of Trustee NRDA investigations, visit the Deepwater Horizon Oil Spill NRDA AR. As of July 23, 2014, the site contains links to more than 165 NRDA work plans. Many of these work plans provide detailed technical methods and implementation information, and are incorporated by reference into this Claim.

[NRDA work plans and study-related data](http://www.gulfspillrestoration.noaa.gov/oil-spill/gulf-spill-data/)

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

[NRDA Administrative Record](http://www.doi.gov/deepwaterhorizon/adminrecord/index.cfm)

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

A list of all signed work plans on the NOAA Internet site is presented in Attachment A-3, which lists the title and date each work plan was signed, as well as the general objectives of the plans. Almost all of these assessment work plans were focused intentionally on the data collection phase after the Incident. Therefore, the assessment plans do not address Trustee activities focused on data compilation, synthesis, analysis, interpretation, reporting, and restoration planning. Many of our activities in this Claim are focused on the analysis and interpretation of scientific data necessary to quantify injuries from the Incident, complete NRDA restoration scaling analyses, and plan for restoration.

Unified Data Management Approach

Immediately after the Incident, NOAA established foundational data systems and management approaches that integrate the environmental data central to the analysis of oil spill impacts and restoration efforts. These approaches promote expeditious collection, management, and analysis of the unprecedented volume of NRDA data. To provide this ongoing Trustee-wide access to new and previously collected data, the NOAA-led data management team (DMT) continues to host several online applications, which requires ongoing infrastructure support, user training, and preparation and deployment of associated information security policies required for Federal data systems.

The NOAA DMT developed and now continues to maintain the data systems and extend the services to meet the ongoing and evolving needs associated with completing the case. Moving through a consistent, established process from raw field collection to analyzed data serves the NRDA goal of forming a well-founded injury assessment by providing evidence of exposure and injury (§ 990.51). The lineage of the injury assessment back to the data evidence must be clear. As new field efforts are undertaken for marine mammals and oysters in 2015, the team will continue to manage these data by tracking the analytical efforts, conducting quality control (QC) reviews, and populating the information repository. The DMT will also continue to track and record newly generated results from previously collected samples under analysis at the numerous laboratories, notably fish and plankton sample work-ups from Texas A&M University and University of Nevada-Reno. Through the use of Data Integration, Visualization, Exploration, and Reporting (DIVER) Explorer, an online data access tool, co-Trustees can search and access such new data as well as previously generated case data, metadata, and files. Trustee and RP representatives can gather available environmental data and trace back from each record to the underlying supporting information developed as part of the case (e.g., Chain of Custody). Over 500 Trustee representatives use the DIVER and other tools to access huge volumes of data associated with the case (>60+terabytes).

To meet the needs of public transparency and restoration reporting requirements, such as the progress reports, technical reports, Programmatic Environmental Impact Statement (PEIS), and the DARP and supporting appendices, the NOAA Information Management Portal will continue to guide Trustee representatives in submitting project-specific planning and implementation updates. As the number of projects and associated information needs grow, the system architecture will also expand to provide a mechanism to manage additional information crucial to long term tracking and reporting, such as project monitoring information submitted by non-NOAA scientists for completed projects. With the case transition to the development of the DARP, the team will also provide overarching support in documentation of the data relied upon in the case and the interconnection between baseline, assessment, and restoration data as well as associated analysis products. Additionally, the team will continue to facilitate public involvement (§ 990.14) through the integration and release of the assessment and restoration data central to the case.

In this Claim, NOAA's data management costs are factored into three areas: 1) as a part of each assessment activity; 2) as a sub-task in the restoration planning activity; and 3) in Section J – Data Management and Visualization.

Restoration Planning Approach

This Claim presents a sum certain for NOAA to complete a public review draft of the DARP. Restoration Planning activities that support the achievement of that milestone include finalization of restoration alternatives analysis; selection of the preferred restoration alternatives; development of a draft DARP, PEIS, and other supporting documentation; and preparation for public meeting requirements. NOAA's overall approach to restoration planning is described in Section L. Restoration Planning Activities later in this document.

Offshore Aquatic Habitat and Resource Investigations

A. Offshore Benthic Habitat and Communities

NOAA is assessing injuries to benthic habitat and natural resources from the oil spill generally within two large geographic areas. The first is on the sea floor within the area around and extending away from the Macondo wellhead, with assessment activities focused on impacts to soft bottom sediments, hard ground corals, and benthic megafauna within the footprint of oiling. The second encompasses fish and coral resources at mesophotic reefs along the continental shelf edge. Assessment activities covered by this Claim will focus on interpretation of data collected during 2014 cruises, statistical analyses, and report writing to support the drafting of technical sections of the DARP, and AR efforts.

Injuries to offshore benthic habitat and biological communities in the vicinity and extending away from the wellhead were caused by the Incident. Montagna et al. (2013) used multivariate methods to show that the most severe relative reduction of faunal abundance and diversity in soft bottom sediments extended to several kilometers (km) of the Macondo wellhead in all directions. Moderate impacts were observed up to 17 km towards the southwest and 8.5 km towards the northeast of the wellhead. These benthic effects were correlated with oil constituents more likely to occur due to an oil spill than natural hydrocarbon seepage, and Montagna et al. (2013) note that recovery rates in the deep sea are likely to be decades or longer. Analyses of polycyclic aromatic hydrocarbon (PAH) concentrations in the hepatopancreas tissues of red crabs collected in 2011 confirm the uptake of petroleum by benthic megafauna in and around the wellhead. The highest concentration observed, 7.7 mg/kg wet weight total PAHs, was from a crab collected within three km of the wellhead.

Three hard ground coral sites have been confirmed to have been injured at distances of six, 13, and 22 km from the wellhead (Fisher et al., 2014). White et al. (2012a) initially presented evidence of widespread signs of stress and the presence of brown flocculant at one octocoral community 13 km southwest at the Macondo well (at 1300 m depth). Hsing et al. (2013) quantified visible changes to the corals at the same site during five visits over 17 months. A journal reply also detailed multiple lines of evidence linking deep water coral damage to the Incident (White et al., 2012b). As part of our injury assessment, we are evaluating oil-affected sites in context with recently-published data on taxonomic and phylogenetic diversity (Quattrini et al., 2014), and ecological niche models for deep sea octocorals (Quattrini et al., 2013). Doughty et al. (2014) note that a common genus of deep-sea coral, *Paramuricea*, are sparsely distributed and exhibit low recruitment rates, making them susceptible to anthropogenic threats like pollution.

In addition to observed resource injuries within the footprint of impacts around the wellhead, mesophotic reefs along the continental shelf edge have experienced declines in the abundance of small, resident planktivorous fish populations, as well as increases in the prevalence of corals with notable injuries, relative to baseline conditions. Although data analyses are ongoing, reef fish abundances at Roughtongue Reef and Alabama Alps Reef, located approximately 60 and 110 km to the north and northeast of the wellhead, respectively, are lower compared to pre-spill abundances and abundances of the same fish species at reference reefs located a greater distances to the northeast of the wellhead. These reefs lie at depths of approximately 60 to 70 m, and Macondo oil persisted on the sea surface above these reefs for periods of weeks. Similar to the analysis of reef fish abundance, our evaluation of coral health data is

ongoing; however, preliminary analyses suggest the odds of coral injuries at Alabama Alps and Roughtongue Reefs are greater than six times higher post-spill as compared to pre-spill. Although pre-spill coral injury is evident at reference reefs located distant from the wellhead and outside the influence of surface oiling, preliminary analyses suggest that the odds of coral injury at those locations did not change from pre-spill to post-spill.

Activity 1: Benthic Oil Injury Footprint Around the Macondo Wellhead

Soft bottom sediment assessment activities have been focused on the identification, enumeration, and analysis of sediment infauna collected as part of Response and NRDA sample collection efforts. The 2014 cruise was planned and implemented in a similar way to previous years (see the 2011 signed cooperative work plan entitled “Deepwater Sediment Sampling to Assess Potential Post-Spill Benthic Impacts from the Deepwater Horizon Oil Spill” and the draft cooperative work plan entitled “Addendum to the Deepwater Sediment Sampling to Assess Potential Post-Spill Benthic Impacts from the Deepwater Horizon Oil Spill”). But, in 2014, some pre-cruise decisions by BP and the Trustees prompted the collection of additional sediment cores, particularly samples arising out of a boxcore-multicorer comparison effort. Specifically, on May 23, 2014, a NOAA Contractor and BP Cruise PIs agreed to collect 157 sediment core samples from five soft bottom sediment sampling stations. These samples were collected and needed for NRDA to evaluate potential differences in the equipment used to sample sediment pre- and post-spill. The results from analysis of these additional cores will allow for a direct comparison of post-spill results collected using a multi-corer to pre-spill baseline data collected with a box-corer. The money to analyze these 157 samples (117 cores for macrofauna, and 40 cores for meiofauna) was not part of our Third IPC (CY 2014). For maximum comparability of data across years, NOAA is planning to analyze the 157 samples in 2015 using the same laboratories used in previous years. Results from these laboratories will then be verified by a BP-contracted laboratory independently.

Funds are requested to write draft DARP sections focused on soft bottom sediment, benthic megafauna, and hard ground coral injuries. We will use interpretive technical reports from the PIs (2014 IPC milestones) to help us write relevant DARP sections and support our interpretation of injuries from the Oil Spill. Completion of DARP technical documentation requires extensive coordination among contract scientists and data managers, and we will coordinate extensively with co-Trustees.

With requested funds in this activity and using data management systems like DIVER, our scientists also will begin arranging the full set of final analytical and observational results, final spatial data layers, final metadata, and other final data types to support the public review version of the DARP. An all-inclusive presentation of technical material is vital to support review of the draft DARP by the public. The full presentation of injury assessment results will document all injuries and detrimental effects observed across benthic footprint investigations since the Incident began. For example, multiple analysis components will be accounted for by our team (Offshore Benthic Habitat and Communities work plans listed in Attachment A-3 and in the bullets below):

- ❖ Habitat photosurveys; drift and time-lapse camera survey results; results from autonomous and remotely operated vehicles
- ❖ Sediment trap and other passive sampling results

- ❖ Sediment core results -macrofauna and meiofauna identification and enumeration; methods comparisons
- ❖ Coral and benthic megafauna density, catch-per-unit-effort, and/or presence/absence
- ❖ Characterization of flocculent-type material and particulate matter
- ❖ Use of toxicity test results in benthic footprint injury assessment
- ❖ All coral and/or red crab tissue, reproductive health, and histology data
- ❖ Benthic habitat characterization across large areas of the Gulf of Mexico
- ❖ Prepare final metadata for individual cruises or sampling efforts
- ❖ Evaluation of soft bottom organisms for visible abnormalities
- ❖ Overall characterization of benthic oil pollution footprint
- ❖ All spatial data and modeling information pertinent to benthic oil footprint injury analyses
- ❖ Historical/Baseline photo and imagery review
- ❖ Interpretive analyses focused on biological variables sensitive to pollution-induced disturbances (i.e., multivariate data analysis methods)
- ❖ All PI-led technical reports and supporting analyses

The result of this activity will be a well-organized and comprehensive set of final technical material that is made available to support the public's review of the draft DARP. Because the volume of scientific information for NRDA is so large and diverse, this all-inclusive data presentation requires substantial coordination among the co-Trustees and Trustee data managers.

Sample/Data Handling and Sharing

Funding is requested for a variety of activity-specific data management activities associated with soft bottom sediment, hard ground corals, and benthic megafauna. First, we are requesting funds for the analysis of 157 sediment core samples. Second, data management processes include coordinating analytical activities; data tracking activities to provide status reports on analytical progress and data availability; third-party validation of lab results to ensure data is in proper format and meets quality standards; secondary quality assurance/quality control (QA/QC) of field data prior to merging with lab results; incorporation into repositories as final, validated products; forensic chemistry to identify source of contamination; and spatial processing and loading into the Environmental Response Management Application (ERMA). Several data sharing tasks are routinely undertaken as new data are available:

- Coordinate the seven-day view period to apprise RP and Trustee leads when new data are pending publication to a public repository;
- Post associated data validation reports to assist RP and Trustee leads in the seven-day view activities;
- Conduct review of data deemed ready for posting to ensure all information has been reviewed and is ready to share; and
- Coordinate with end-user system contacts to ensure new data are represented correctly in the end-user systems.

Once new data records are complete and the quality review conducted, the data are published to different repositories external to NOAA. In particular, the data team focuses on posting information for use by the

public. The bulk of the data sharing for benthic footprint analyses has been focused on sample results; however, we anticipate also needing to release observation and other data collected in the coming months.

These data management tasks are necessary to comprehensively maintain and ensure proper document and data preservation and develop consistent data suitable for application in the damage assessment. Through the tracking and integration process, the DMT works to consolidate the information in the case into organized and comprehensive repositories. The tracking of analysis product data usage helps ensure that all individuals are using consistent, up-to-date data products. The effort to maintain the infrastructure for those repositories and conduct the quality control for records is represented in separate data management-specific procedures.

Level of Effort

Our request for benthic injury footprint is \$1.49M in contract funds and \$359,500 in agency funds. These costs include 1.3 agency full time equivalents (FTEs) and 7.5 contract equivalents. Key personnel include the PIs and their staff, agency scientists, and contractors from Industrial Economics, Incorporated (IEc). Please refer Attachment A-6 for a detailed breakdown of costs.

PIs (NOAA and other)

Sediment macrofauna are being evaluated by Dr. Paul Montagna and his team at Texas A&M University and meiofauna are being evaluated by Dr. Jeff Baguley and his team at the University of Nevada, Reno. Dr. Jeff Hyland and Ms. Cynthia Cooksey of NOAA are providing technical support.

Deep Sea Hard Ground Coral reporting will be undertaken primarily by Dr. Chuck Fisher (Pennsylvania State University).

Ms. Harriet Perry, Ms. Darcie Graham, and Mr. Mark Myers, investigators responsible for red crab activities performed in 2014, as well as personnel from the Smithsonian and NOAA's Northwest Fisheries Science Center, will play roles NRDA activities.

PIs related to the management of data for this procedure include: Amy Merten (NOAA), Ben Shorr, (NOAA), Daniel Hudgens (IEc), Tyler Vick (MFA), Peggy Myre (Exa), Jay Coady (IMSG), and Jim Anderton (Solea). Attachment A-5 provides further details of PI qualifications.

Administrative Record

The NOAA team will continue to respond to requests for documents to complete the AR. This activity will include providing new documents and data related to laboratory analyses and offshore benthic community injury assessment. The costs of the NOAA team in gathering and providing these records for AR purposes is captured here; the costs of capturing and processing these records for AR purposes is captured under the AR Tasks.

Activity 2: Mesophotic Reefs

NOAA is evaluating injuries to planktivorous fish and corals within mesophotic reefs residing along the length of the continental shelf at depths ranging from 60 to 90 m. Video analysis of selected reef areas

since 2011 focused only on data collected in 2010 and 2011 and on pre-spill data. In 2014, additional follow-up imagery was collected at mesophotic reefs. Leading up to the 2014 cruise effort, two additional activities were identified for which 2014 funding was not requested, but which the Trustees determined to be needed for support mesophotic reef injury assessment efforts. NOAA is requesting funding in this Claim for analyses associated with these new data.

The first analysis, initiated based on suggestive results from a time-lapse camera deployed in 2011, was to robustly document diurnal reef fish patterns to ensure that observed decreases in fish abundance are not unduly influenced by sampling bias introduced by the time of day when video was collected. Documentation of diurnal fish patterns was therefore done using additional repeated deployments of time-lapse cameras on the mesophotic reef cruise in 2014.

The second analysis arose out of the recent identification of a pre-spill photograph dataset – the Mississippi/Alabama Pinnacle Trend Ecosystem Monitoring Program photograph dataset (Continental Shelf Associates, Inc. et al., 2001). Because this historical dataset included random downward looking pre-spill photographs, similar post-spill random photographs were collected during the 2014 mesophotic reef cruise. Acquisition and analysis of these random photos to assess coral health will support the statistical robustness of injury assertions related to mesophotic reef corals.

In addition to these two new imagery analyses, funds are requested to write draft DARP sections focused on mesophotic reef injuries. We will use interpretive technical reports from the PIs (2014 IPC milestones) to help us write the mesophotic reef DARP sections and support our interpretation of injuries from the Oil Spill. Completion of technical documentation requires extensive coordination among contract scientists and data managers, and we will coordinate extensively with co-Trustees.

With requested funds in this activity and using data management systems like DIVER, our scientists also will begin arranging the full set of final analytical and observational results, final spatial data layers, final metadata, and other final data types to support the public review version of the DARP. An all-inclusive presentation of technical material is vital to support review of the draft DARP by the public. The full presentation of injury assessment results will document all injuries and detrimental effects observed across mesophotic reef investigations since the Incident began. For example, multiple analysis components will be accounted for by our team (Offshore Benthic Habitat and Communities work plans listed in Attachment A-4 and in the bullets below):

- ❖ Final metadata for individual cruises or sampling efforts
- ❖ All relevant data for mesophotic reef coral health assessments
- ❖ Overall characterization of contamination in sediments and the water column proximate to mesophotic reefs
- ❖ Video and photographic results from remotely operated vehicle dives and other sampling methods to assess fish abundance and coral health
- ❖ All spatial data and modeling information pertinent to mesophotic reefs
- ❖ Historical/Baseline photo and imagery review
- ❖ All PI-led technical reports and associated analyses for mesophotic reefs

The result of this activity will be a well-organized and comprehensive set of final technical material that will be made available to support the public's review of the draft DARP. Because the volume of scientific

information for NRDA is so large and diverse, this all-inclusive data presentation requires substantial coordination among the co-Trustees and Trustee data managers.

Data Handling and Sharing

Funding is requested to maintain and share large amounts of mesophotic reef NRDA data, including terabytes of video evaluated for the injury assessment. Once data records are complete and the quality review conducted, the data are published to different repositories external to the NOAA Trustee group. In particular, the data team focuses on posting information for use by the public. The bulk of the data sharing has been focused on sample results; however, we anticipate also needing to release observation and other data collected in the coming months. Several data sharing tasks are routinely undertaken as new data are available:

- Coordinate the seven-day view period to apprise RP and Trustee leads when new data are pending publication to a public repository;
- Post associated data validation reports to assist RP and Trustee leads in the seven-day view activities;
- Conduct review of data deemed ready for posting to ensure all information has been reviewed and is ready to share; and
- Coordinate with end-user system contacts to ensure new data are represented correctly in the end-user systems.

These data management tasks are necessary to comprehensively maintain and ensure proper document and data preservation and develop consistent data suitable for application in the damage assessment. Through the tracking and integration process, the DMT works to consolidate the information in the case into organized and comprehensive repositories. The tracking of analysis product data usage helps ensure that all individuals are using consistent, up-to-date data products. The effort to maintain the infrastructure for those repositories and conduct the quality control for records is represented in separate data management-specific procedures.

Level of Effort

Our request for mesophotic reefs is \$412,300 in contract funds and \$163,100 in agency funds. These costs include 0.6 agency FTEs and 1.3 contract equivalents. Please refer Attachment A-6 for a detailed breakdown of costs.

PIs (NOAA and other)

Dr. Ken Sulak and his team at the U.S. Geological Survey have been responsible for fish assessment to date, and will be responsible for NRDA activities related to assessment of injuries to planktivorous fish. Dr. Peter Etnoyer and his team at NOAA, and Dr. Ian MacDonald of Florida State University will both be focusing on reporting activities related to the mesophotic reef coral health assessment.

PIs related to the management of data for this procedure include: Amy Merten (NOAA), Ben Shorr, (NOAA), Daniel Hudgens (IEc), Tyler Vick (MFA), Peggy Myre (Exa), Jay Coady (IMSG), and Jim Anderton (Solea). Attachment A-5 provides further details of PI qualifications.

Administrative Record

The NOAA team will continue to respond to requests for documents to complete the AR. This activity will include providing new documents and data related to mesophotic reef injury assessment analyses. The costs of the NOAA team in gathering and providing these records for AR purposes is captured here; the costs of capturing and processing these records for AR purposes is captured under the AR Tasks.

B. Water Column

Agency and contract funds are requested for finalizing analyses and fulfilling required documentation requirements associated with the Water Column injury assessment. This work includes completion of processing and analysis of plankton and nekton samples collected in 2010 and 2011, updating the oil on water analysis, and incorporating water column results, including Atlantic bluefin tuna, into the draft DARP and other technical documentation released for public review.

The release of MC252 oil and application of chemical dispersants had a high probability of causing substantial harm to organisms throughout the Gulf of Mexico. Fish and invertebrates throughout the water column, from ocean depths to surface, were exposed to both dissolved and droplet forms of contaminants by swimming through the water column, passing water over respiratory structures, and ingesting water and particulates contaminated with oil as part of feeding. The Water Column Work Group undertook a large, multifaceted oceanographic field program involving 42 cooperative work plans with BP that required multiple oceanographic research vessels, remotely operated underwater vehicles, aircraft, satellite resources, and much specialized equipment. The study area was large and diverse, covering the full range of environments from deep sea, to the ocean surface, to the shoreline and across nearly 700 km of the northern Gulf of Mexico. This effort produced a large inventory of biological and chemical samples and voluminous electronic data, all of which required extensive processing.

The processed field-collected data, historical data, and models have been used to describe the extent and severity of surface and subsea oil and quantify injury to water column organisms in the Gulf of Mexico. The Incident also occurred during the peak of the known bluefin tuna spawning period, thereby exposing these fish at all life stages to discharged oil. Tagged tuna behavior and models have been used to demonstrate that oiled waters exposed spawning adults and injured eggs and larval tuna. Oceanographic conditions suitable for spawning bluefin tuna adults were documented in and near waters oiled in 2010.

Activity 3: Transport, Fate, and Effects Modeling

In NOAA's Third IPC, the NPFC funded three activities related to water column injury and injury modeling: *Oil Fate Modeling and Comparisons with Observational Data*; *Hydrodynamic Modeling*; *Exposure and Injury Modeling and Data Inputs*.

2014 Activity Oil Fate Modeling and Comparisons with Observational Data

In 2014, NOAA will have completed the majority of activities associated with modeling the distribution and composition of oil in the water column, on the water surface, on shorelines, and in the sediments through time. We are still comparing oil fate and transport model results to physical, chemical, and remotely-sensed data and reporting these results in technical reports.

NOAA will need to respond to co-Trustee review and comments on a large volume of updated fate and transport model results generated in 2014. We also need to evaluate NOAA's fate and transport modeling results in context with modeling activities conducted by the States. Additionally, large volumes of water column data have recently been released by BP. Using funds in this activity, NOAA will evaluate and compare these data to our final model results (Attachment A-2).

2014 Activity: Hydrodynamic Modeling

Hydrodynamic modeling for use in water column injury assessment was completed in 2014. Review by technical experts and PI-led technical reporting is expected to be complete by the end of 2014. Hydrodynamic model results have been and continue to be used for water column injury assessment and are a key input for the fate and transport modeling. In this Claim, NOAA is not requesting additional funds for hydrodynamic modeling.

2014 Activity: Exposure and Injury Modeling and Data Inputs

In 2014, NOAA will complete a large majority of the injury modeling for plankton, fish, and invertebrates, resulting in estimates of injuries caused by the release of oil and application of dispersants. Biological information on behavior, movement, and life history of water column biota from published literature and incident-specific studies has been incorporated into the injury modeling. In this Claim, NOAA is not requesting additional funds associated with Exposure and Injury Modeling and Data.

Oil on Water

Since the Incident began, NOAA and co-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 spill. These complementary analyses provided initial maps of the spatial extent of both sheen and thick oil for most individual days of the spill, with some gaps in coverage both spatially and temporally. In addition to direct interpretation of the various sensors on a pixel-by-pixel basis, a gridded oil on water assessment product was also produced. Estimates of oil distribution and coverage via remote sensing methods were compared to fate and transport models using various time periods and spatial scales. Two datasets were required for the analysis because synthetic aperture radar (SAR) and Moderate Resolution Imaging Spectroradiometer (MODIS) data are mostly available on different days after the spill, though when they are available on the same day, we use that information to refine our surface oil analyses.

The oil on water group recently became aware of and received approximately 20 additional days of raw SAR data from NOAA National Environmental Satellite, Data, and Information Service. These data, collected during the spill, are multiple terabytes of raw data directly from the satellite. The existing SAR data for the same days that have already been analyzed in the Trustee NRDA were pre-processed at the University of Miami. The pre-processed data often lost information that helps to discern locations of thick, emulsified oil. The new raw data can provide additional information on the *location* of emulsified oil in addition to filling spatial and temporal data gaps. However, the images require entirely new algorithms for data processing. With requested funds, these algorithms will need to be developed and evaluated for the water column injury assessment. We expect the new SAR dataset will help us hone our oil on water injury quantification. Any modifications to our earlier iterations of oil thickness evaluations will be reflected in draft DARP sections and other technical documentation. The oil on water mapping

product is critical to multiple parts of the assessment, including but not limited to Spill Impact Model Application Package modeling, marine mammal, sea turtle, fish injury, and toxicity activities.

We are using MODIS data to discern areas of *thick oil versus thin oil* in images. We rely upon an algorithm that integrates the National Aeronautics and Space Administration's high-resolution Airborne Visible/Infrared Imaging Spectrometer (AVIRIS) data collected from an airplane during the oil spill. The U.S. Geological Survey (using NRDA funding from DOI that was previously adjudicated from NPFC) will apply an AVIRIS algorithm to data from several flight lines collected during the spill that were previously unprocessed. These AVIRIS data and MODIS imagery will greatly enhance the available dataset that the oil-on-water group can use to *estimate locations of thick oil*. Requested funds will be used to revise the MODIS algorithm for estimating the spatial extent of surface oil using the newly-available AVIRIS datasets. Our team will then re-process all 19 available MODIS images using the revised algorithm. In conclusion, our new oil on water analyses will result in a set of updated MODIS images that will be paired with a set of updated SAR data, mostly on different days. The complementary analyses will help us generate more accurate estimates of surface oil distribution and thickness after the Incident, and produce gridded surface oiling products for water column models, draft DARP sections, and other technical documentation.

In addition to the updated SAR/MODIS/AVIRIS imagery analyses, funds are requested to write updated draft DARP sections focused on transport, fate, and effects modeling, including oil-on-water evaluations. We will use interpretive technical reports from the PIs (2014 Claim milestones) to help us write the DARP section and support our interpretation of injuries from the Oil Spill. Completion of technical documentation requires extensive coordination among contract scientists and data managers, and we will coordinate extensively with co-Trustees. NOAA expects to address many co-Trustee comments on a large volume of updated fate and transport model results. We will make adjustments to injury models and oil on water products, as needed, based on that technical feedback and other updated water column injury findings.

With requested funds in this activity and using data management systems like DIVER, our scientists also will begin arranging the full set of final analytical and observational results, final spatial data layers, final metadata, and other final data types to support the public review version of the DARP. An all-inclusive presentation of technical material is vital to support review of the draft DARP by the public. The full presentation of injury assessment results will document all injuries and detrimental effects observed across fate, transport, and effects investigations since the Incident began. For example, multiple analysis components or interpretive analysis activities will be accounted for by our team (Water Column work plans listed in Attachment A-3 and in the bullets below):

- ❖ Animal tracks and associated habitat use analyses from various types of telemetry
- ❖ In-situ and remotely-sensed oceanographic data
- ❖ Hydrodynamic models and other physical models (e.g., blowout model, currents), including comparisons with in-situ data
- ❖ Distribution and abundance information for biological resources, summarized over space and time
- ❖ Fate and effects modeling results using chemical, biological, physical, and toxicological information

- ❖ Oil on water products derived from remote sensing information
- ❖ Prepare final metadata for sampling efforts or models
- ❖ All spatial data pertinent to fate, transport, and effects modeling, including oil on water analyses and animal telemetry
- ❖ Historical/baseline datasets of resource distribution and abundance, life history, ocean conditions, and tagged animal behavior
- ❖ All PI-led technical reports and associated analyses for physical-chemical observational data, hydrodynamic modeling, fate, transport, and effects modeling, animal telemetry, and remote sensing evaluations

The result of this activity will be a well-organized and comprehensive set of final technical material that is made available to support the public's review of the draft DARP. Because the volume of scientific information for NRDA is so large and diverse, this all-inclusive data presentation requires substantial coordination among the co-Trustees and Trustee data managers.

Data Handling and Sharing

Funding is requested for a variety of activity-specific data management activities associated with water column modeling. Once data and modeling records are complete and the quality review conducted, the data are published to different repositories external to the NOAA Trustee group. In particular, the data team focuses on posting information for use by the Public. The bulk of the data sharing has been focused on sample results; however, we anticipate also needing to release selected modeling and imagery data in the coming months. Several data sharing tasks are routinely undertaken as new data are available:

- Coordinate the seven-day view period to apprise RP and Trustee leads when new data are pending publication to a public repository;
- Post associated data validation reports to assist RP and Trustee leads in the seven-day view activities;
- Conduct review of data deemed ready for posting to ensure all information has been reviewed and is ready to share; and
- Coordinate with end-user system contacts to ensure new data are represented correctly in the end-user systems.

These data management tasks are necessary to comprehensively maintain and ensure proper document and data preservation and develop consistent data suitable for application in the damage assessment. Through the tracking and integration process, the DMT works to consolidate the information in the case into organized and comprehensive repositories. The tracking of analysis product data usage helps ensure that all individuals are using consistent, up-to-date data products. The effort to maintain the infrastructure for those repositories and conduct quality control of records is represented in separate data management-specific procedures.

Level of Effort

Our request for fate, transport, and effects modeling is \$296.9K in contract funds and \$623,000 in agency funds. These costs include 0.8 contract equivalents and 2.2 agency FTEs. Please refer Attachment A-6 for a detailed breakdown of costs.

PIs (NOAA and other)

The PIs for this procedure are Dr. Deborah French McCay, Dr. Malcolm Spaulding, Dr. Yong Kim, Dr. Mathew Horn, George Graettinger, Jamie Holmes, Dr. Oscar Garcia-Pineda, Dr. Ian MacDonald, Dr. Chuanmin Hu, Dr. Frank Muller-Karger, and Dr. Jan Svejksky.

PIs related to the management of data for this procedure include: Amy Merten (NOAA), Ben Shorr, (NOAA), Daniel Hudgens (IEc), Tyler Vick (MFA), Peggy Myre (Exa), Jay Coady (IMSG), and Jim Anderton (Solea). Attachment A-5 provides further details of PI qualifications.

Administrative Record

The NOAA team will continue to respond to requests for documents to complete the AR. This activity will include providing new documents and data related to water column injury assessment analyses. The costs of the NOAA team in gathering and providing these records for AR purposes is captured here; the costs of capturing and processing these records for AR purposes is captured under the AR Tasks.

Activity 4: Fish and Plankton

In order to gain the most complete picture of seasonal trends in the aftermath of the spill and to support the injury quantification based on integration of contemporaneous data sources, NOAA and contractors will use requested funds to complete the processing of 2,000 plankton samples and 400 nekton samples. At the end of 2014, it is expected that nearly 6,000 plankton samples and 900 nekton samples will have been completed.

Previous BP funding supported both the plankton processing and the nekton processing programs in 2012 pursuant to the cooperative DWH NRDA Plankton Processing Plan and Nekton Plan, respectively. In 2013, BP funds were received to continue processing the plankton and nekton samples. At that time, a sample unit cost estimate was used to project a total budget for processing the more than 7,000 plankton samples that had been collected in 2010 and 2011. The BP funds received in 2013 have been carried over and have continued to support the plankton processing labs through 2014. Those funds will not be sufficient to analyze all of the plankton samples. The nekton program's budget was developed based on a one-year budget for each of the labs. Nekton funding was requested in 2014 and those funds were received from the NPFC to support the nekton labs in 2014. Those funds will not be sufficient to analyze all of the nekton samples.

The original budgets for the plankton and nekton programs were developed based on a projected per-sample processing cost that was expected to fund the completion of the sample processing. The estimates did not include a budget for costs associated with program oversight, data documentation, and data delivery procedures, all of which have been extensive. As a result, the previous budget requests will continue to support the labs through 2014 but will not be sufficient to complete the processing of the remaining samples.

The request for additional funds in this Claim would support the completion of the sorting and identification of all remaining plankton and nekton samples. For the nekton samples, we expect to have completely sorted, identified, and delivered to BP and Trustees data from the Meg Skansi 7, Meg Skansi

8, Pisces 10, and Pisces 12 cruises by the end of 2014. The additional funding request would support the nekton processing labs for completion of nekton samples collected from the remaining cruises, including the Meg Skansi 6, Pisces 9, and Pisces 8 (see Attachment A-7, for detailed description of Nekton cruise information). This includes complete sorting, identification, QA/QC, data entry, documentation and delivery. Based on current sample processing rates, we project the completion of all nekton data deliverables by late summer or early fall 2015. Additional funding is also requested for additional data interpretation from the PIs, and technical reporting.

Under the plankton processing program there are currently six labs sorting, identifying, and scanning plankton samples, including three NOAA Southeast Fisheries Science Center (SEFSC) labs, Louisiana State University, University of Southern Mississippi, and the University of Miami. Each lab participates in one or more of the sample processing steps which includes sorting and identifying ichthyoplankton, decapods, and zooplankton. Managing the sample flow through multiple labs with multiple processing steps and QA/QC requires an extremely high level of sample management and coordination. Labs are continuing to process samples through 2014 and based on current processing rates expect to have completed sorting 6,000 of the nearly 8,000 samples that were collected. By the end of 2014, we expect to have delivered data to BP and the Trustees for Tiers 1A, 1B, 1C, 1E and 2B with complete ichthyoplankton and decapod identifications (see Plankton Processing Plan, Attachment A-7, for detailed description of Plankton Tiers and cruise information). At the end of 2014 we expect that samples from Tiers 2-3 will be in some intermediate stage of processing (e.g., sample sorted, decapod ID complete, ichthyoplankton and zooplankton ID in progress). The remaining stages of processing will need to be completed, including sample ID QA/QC, data entry and database QA/QC, and data documentation and delivery. We anticipate that approximately 2,000 samples from Tiers 3 and 4 will remain for the full processing in 2014. These samples were collected on the Nick Skansi 8 and 10, Bunny Bordelon 7, Oregon II cruises. The remaining Tiers 2-4 sample data will provide important information on biological densities and distributions covering additional seasons in 2010 and 2011, using different gear type over a greater spatial area in the northern Gulf of Mexico.

Again, we are requesting new funds to support the plankton and nekton processing labs so they can complete all sample sorting, identification, and scanning, as well as our continued program oversight, data documentation, and data delivery procedures. Additional funding is also requested for data interpretation from the PIs, and technical reporting.

Funds also are requested to write draft DARP sections focused on fish and plankton injuries. We will use interpretive technical reports from the PIs (2014 IPC milestones) to help us write the DARP section and support our interpretation of injuries from the Oil Spill. Completion of technical documentation requires extensive coordination among contract scientists and data managers, and we will coordinate extensively with co-Trustees. NOAA expects to address many co-Trustee comments on a large volume of updated fish and plankton results. We will make adjustments to the injury assessment, as needed, based on that technical feedback and other updated water column injury findings.

With requested funds in this activity and using data management systems like DIVER, our scientists also will begin arranging the full set of final analytical and observational results, final spatial data layers, final metadata, and other final data types to support the public review version of the DARP. An all-inclusive presentation of technical material is vital to support review of the draft DARP by the public. The full

presentation of fish and plankton injury assessment results will document all injuries and detrimental effects observed across fish and plankton investigations since the Incident began. For example, multiple analysis components will be accounted for by our team (Water Column work plans listed in Attachment A-3 and in the bullets below):

- ❖ Distribution, community assemblage, and abundance information for fish, plankton, and nekton, summarized over space and time
- ❖ Final metadata for sampling efforts
- ❖ All spatial data pertinent to fish and plankton injury assessment analyses
- ❖ Historical/Baseline datasets of fish/plankton/nekton distribution, community composition, and abundance, life history, and ocean conditions
- ❖ All PI-led technical reports and associated analyses for fish and plankton/nekton

The result of this activity will be a well-organized and comprehensive set of final technical material that is made available to support the public's review of the draft DARP. Because the volume of scientific information for NRDA is so large and diverse, this all-inclusive data presentation requires substantial coordination among the co-Trustees and Trustee data managers.

Sample/Data Handling & Sharing

As part of this activity, we are requesting funds for the laboratory analysis and data handling associated with 2,000 plankton and 400 nekton samples. The data management process includes coordinating analytical activities; data tracking activities to provide status reports on analytical progress and data availability; third-party validation of lab results to ensure data is in proper format and meets quality standards; secondary QA/QC of field data prior to merging with lab results; incorporation into repositories as final, validated products; and spatial processing and loading into ERMA. Several data sharing tasks are routinely undertaken as new data are available:

- Coordinate the seven-day view period to apprise RP and Trustee leads when new data are pending publication to a public repository;
- Post associated data validation reports to assist RP and Trustee leads in the seven-day view activities;
- Conduct review of data deemed ready for posting to ensure all information has been reviewed and is ready to share; and
- Coordinate with end-user system contacts to ensure new data are represented correctly in the end-user systems.

Once data records are complete and the quality review conducted, the data are published to different repositories external to the NOAA Trustee group. In particular, the data team focuses on posting information for use by the public. The bulk of the data sharing has been focused on sample results; however, we anticipate also needing to release observation and other data collected in the coming months.

These activity-specific data management tasks are necessary to comprehensively maintain and ensure proper document and data preservation and develop consistent data suitable for application in the damage assessment. Through the tracking and integration process, the DMT works to consolidate the information in the case into organized and comprehensive repositories. The tracking of analysis product data usage

helps ensure that all individuals are using consistent, up-to-date data products. The effort to maintain the infrastructure for those repositories and conduct quality control for records is represented in separate data management-specific procedures.

Level of Effort

Our request for fish and plankton is \$7.55M in contract funds and \$1.04M in agency funds. These costs include 3.8 agency FTEs and 14.9 contract equivalents. Of the \$8.59M total, \$6.3M in agency and contract funds are for the completion of plankton processing and analysis and \$1.2M in agency and contract funds are for the completion of nekton sample processing and analysis. Please refer to Attachment A-6 for a detailed breakdown of costs.

PIs (NOAA and other)

The PIs for this procedure are Dr. Malinda Sutor, Dr. Joanne Lyczkowski-Shultz, Dr. Trika Gerard, Dr. James Ditty, Dr. Richard Heard, Sara LeCroy, Dr. Robert Cowen, Maria Criales, Carley Knight, Dr. Tracey Sutton, Dr. Jon Moore, Dr. Tamara Frank, Dr. Martha Nizinski, Dr. Michael Vecchione, Dr. Heather Judkins, Dr. Bruce Collette, Dr. David Wells, and Dr. Marsh Youngbluth.

PIs related to the management of data for this procedure include: Amy Merten (NOAA), Ben Shorr, (NOAA), Daniel Hudgens (IEc), Tyler Vick (MFA), Peggy Myre (Exa), Jay Coady (IMSG), and Jim Anderton (Solea). Attachment A-5 provides further details of PI qualifications.

Administrative Record

The NOAA team will continue to respond to requests for documents to complete the AR. This activity will include providing new documents and data related to laboratory analyses and injury assessment analyses focused on fish and plankton. The costs of the NOAA team in gathering and providing these records for AR purposes is captured here; the costs of capturing and processing these records for AR purposes is captured under the AR Tasks.

C. Sea Turtles

Activity 5: Aquatic Sea Turtle Injury Quantification

Since 2010, NOAA has been undertaking efforts to determine the number of oceanic and neritic sea turtles exposed to MC252 oil using survey data collected from directed capture efforts and aerial surveys. Details regarding these efforts are provided in various work plans developed to date, including the *Aerial Surveys for Marine Mammals and Turtles*, *Assessing Population Size Work Plan and Addendum*, and the *Spatial Distribution of Marine Mammals and Sea Turtles in the Northern Gulf of Mexico Work Plan and Addendum*.

During 2013, funds were requested to determine the mortality these oceanic and neritic turtles experienced based upon their degree of oiling, using supporting data from necropsy findings, exposure via oil ingestion, estimates of biological impacts to sea turtles from veterinary and toxicological scientists,

ingestion of potentially contaminated prey items, postmortem sea turtle sample analysis, inhalation exposure analysis, as well as sea turtle stranding data.

Work in 2014 continued to focus on quantifying injury to sea turtles, incorporating results from a sea turtle surrogate study, refining estimates of pelagic sea turtle habitat, sea turtle tag dive analysis, surface oil mapping products, mapping products characterizing impacts from on-water Response actions and expert opinions developed by the Northern Gulf of Mexico and Sea Turtle Mortality Working Group and the Life History Table Working Group. Data and analyses generated collectively from these efforts, as well as DOI's efforts on exposure and injury assessment of nesting sea turtles and hatchlings, are being synthesized into a PI-led Sea Turtle Exposure and Injury Assessment Report that will be compiled by the end of 2014.

Funds are requested to integrate the exposure and injury assessment findings into technical DARP sections. We will conduct a process that involves expert and co-Trustee review of the Sea Turtle Exposure and Injury Assessment Report and considers new data that BP has recently provided (Attachment A-2). Also with requested funds in this activity and using data management systems like DIVER, our scientists also will begin arranging the full set of final analytical and observational results, final spatial data layers, final metadata, and other final data types to support the public review version of the DARP. An all-inclusive presentation of technical material for sea turtles is vital to support review of the draft DARP by the public. The full presentation of injury assessment results will document all injuries and detrimental effects observed across NOAA-led sea turtle investigations since the Incident began. For example, multiple analysis components or interpretive analysis activities will be accounted for by our team (Sea Turtles work plans listed in Attachment A-3 and in the bullets below):

- ❖ Distribution and abundance information for sea turtles, summarized over space and time
- ❖ *Sargassum* distribution, community data, and mapping
- ❖ Analysis of video in *Sargassum* communities from remotely operated vehicles and various imagery types from overflights
- ❖ Analysis of dead, live, captured, and stranded sea turtles, including laboratory analysis of turtle tissues and external swabs
- ❖ Abundance and distribution of neritic sea turtles, including turtle dive patterns from tagged animals and data from extensive aerial transect surveys
- ❖ Density, condition, diet, and potential oil exposure of pelagic neonate sea turtles associated with floating *Sargassum*
- ❖ Sea turtle prey availability
- ❖ Estimates of biological impacts from veterinary and toxicological expert panels and postmortem sample analysis
- ❖ Necropsy findings and pertinent findings from marine mammal inhalation assessments
- ❖ Pertinent analysis of sea turtle strandings and mortality in the same area and time period as the marine mammal unusual mortality event (UME)
- ❖ All spatial data pertinent to sea turtle injury assessment analyses, including oil on water products and mapping products characterizing impacts from on-water Response actions and expert opinions developed by the Northern Gulf of Mexico and Sea Turtle Mortality Working Group and the Life History Table Working Group.

- ❖ All toxicity test data pertinent to the sea turtle exposure and injury assessment, including results from a sea turtle surrogate study
- ❖ Historical/baseline datasets of sea turtle distribution and abundance, life history, and ocean conditions
- ❖ All PI-led technical reports and associated analyses for sea turtles

The result of this activity will be a well-organized and comprehensive set of final technical material that is made available to support the public's review of the draft DARP. Because the volume of scientific information for NRDA is so large and diverse, this all-inclusive data presentation requires substantial coordination among the co-Trustees and Trustee data managers.

Data Handling and Sharing

Funding is requested for a variety of activity-specific data management activities associated with sea turtles. Once data and modeling records are complete and the quality review conducted, the data are published to different repositories external to the NOAA Trustee group. In particular, the data team focuses on posting information for use by the public. The bulk of the data sharing has been focused on sample results; however, we anticipate also needing to release other types of data in the coming months. Several data sharing tasks are routinely undertaken as new data are available:

- Coordinate the seven-day view period to apprise RP and Trustee leads when new data are pending publication to a public repository;
- Post associated data validation reports to assist RP and Trustee leads in the seven-day view activities;
- Conduct review of data deemed ready for posting to ensure all information has been reviewed and is ready to share; and
- Coordinate with end-user system contacts to ensure new data are represented correctly in the end-user systems.

These data management tasks are necessary to comprehensively maintain and ensure proper document and data preservation and develop consistent data suitable for application in the damage assessment. Through the tracking and integration process, the DMT works to consolidate the information in the case into organized and comprehensive repositories. The tracking of analysis product data usage helps ensure that all individuals are using consistent, up-to-date data products. The effort to maintain the infrastructure for those repositories and conduct quality control of records is represented in separate data management-specific procedures.

Level of Effort

Our request is for \$1.07M in contract funds and \$480,100 in agency funds. These costs include 1.7 Agency FTEs and 2.9 contract equivalents. Please refer Attachment A-6 for a detailed breakdown of costs.

PIs (NOAA and other)

The lead NOAA PIs for this activity are Barbara Schroeder, Dr. Brian Stacy, and Dr. Lance Garrison. Funding is also requested for peer reviewers (turtle experts subcontracted under IEC) to review the Sea Turtle Injury and Assessment Report compiled in 2014. In addition, the budget for this activity also includes funding for NOAA scientists (Diane Wehner, Sara McNulty, Paul Richards, and Jennifer Keene), Gina Ylitalo (Montlake Lab), a statistician (Trent McDonald, West, Inc.), and a toxicologist (Tracy Collier), to participate in the review of BP data, respond to and update the Injury Exposure and Assessment Report based upon peer and co-Trustee review comments and BP data.

PIs related to the management of data for this procedure include: Amy Merten (NOAA), Ben Shorr, (NOAA), Daniel Hudgens (IEC), Tyler Vick (MFA), Peggy Myre (Exa), Jay Coady (IMSG), and Jim Anderton (Solea). Attachment A-5 provides further details of PI qualifications.

Administrative Record

The NOAA team will continue to respond to requests for documents to complete the AR. This activity will include providing new documents and data related to sea turtle injury assessment analyses. The costs of the NOAA team in gathering and providing these records for AR purposes is captured here; the costs of capturing and processing these records for AR purposes is captured under the AR Tasks.

D. Marine Mammals

Activity 6: Estuarine and Coastal Dolphins

NOAA's approach to injury assessment since 2010 is to use both live animal health assessment and examination of dead animals to address causal linkages to oil and other stressors in areas exposed to oil compared to reference populations. Data from longitudinal mark/recapture surveys (photo-ID), stranding counts, and aerial surveys and satellite tagging are used to assess abundance of exposed population, survivorship, mortality rates, fecundity, and movement—all important for quantifying losses. Follow-up reproductive surveys of known pregnant females provide information on reproductive success. Genetics, satellite tagging and stable isotope analysis help to identify stock structure and site fidelity (important to documenting exposure and identifying appropriate restoration).

Multiple stocks of bottlenose dolphins (*Tursiops truncatus*) in bays, sounds, estuaries and coastal areas were likely exposed to oil and Response activities from the oil spill. The NRDA initiated a combination of cooperative preassessment and assessment field work beginning in the summer of 2010, with the last of the cooperative field work ending in summer 2013. Non-cooperative studies continued into 2014. In addition, 2010 was the first of several years of unusually high marine mammal strandings in the northern Gulf of Mexico, precipitating the declaration of an UME under the Marine Mammal Protection Act (MMPA). Data and analyses from marine mammal strandings are being incorporated into the injury assessment for estuarine and coastal dolphins (see “Coastal and Estuarine Cetacean Strandings”).

Information from NRDA live animal studies and stranding response for the Northern Gulf of Mexico cetacean UME have documented heightened mortality, a high incidence of reproductive failure, and a number of health issues. To date, the dolphin health assessment studies have found endocrine, respiratory,

and hepatic disease in Barataria Bay dolphins consistent with adverse health effects reported from experimental oil exposure studies. Specifically, severe lung damage, evidence of poor adrenal stress response, and abnormal liver enzymes were observed. These health conditions were not observed in reference dolphins from Sarasota Bay. The dolphin health assessments from 2011 indicate that bottlenose dolphins in Barataria Bay showed signs of severe ill health, with 44% of dolphins sampled in Barataria Bay given a “guarded”, “poor” or “grave” prognosis. Symptoms included low body weight, anemia, low blood sugar, and/or symptoms of liver and lung disease. Nearly half of the 32 dolphins examined also had abnormally low levels of the hormones that help with stress response, metabolism, and immune functions.

Results from live capture assessments from 2013 in Barataria Bay and Mississippi Sound suggested some improvements in some endpoints from Barataria Bay dolphins, but also some indications of more chronic effects in both Barataria Bay and Mississippi Sound dolphins.

In June 2014, NOAA conducted one additional health assessment in Barataria Bay targeting previously-captured dolphins. Preliminary results suggest continuing poor overall body condition and lung disease in some animals, although at a lower prevalence than in 2011.

Schwacke et al. (2014a) summarized findings from 2011 health assessments. The authors also responded to questions in a supplemental journal response (Schwacke et al., 2014b).

Reproductive effects have also been documented based on health assessments, follow-up reproductive surveys, and the prevalence of neonates in the stranding record. Similar to activities in 2011-12, dolphins known to be pregnant from 2013 health assessments were surveyed in the spring and summer 2014 (just after their due dates) for presence of calves. Preliminary results suggest continuing adverse reproductive effects in both Mississippi Sound and Barataria Bay.

NOAA is currently preparing reports and analyses documenting quantified losses of estuarine and coastal dolphins and the mechanisms of loss from longitudinal surveys (2010-2014), reproductive follow up surveys (2012-2014), aerial surveys (2010-2011), stranding response (2010 to present), health assessments (2010-2014), remote biopsy (2010-2012) and other data sources.

In 2014, PI-led reports are being prepared documenting adverse effects and quantifying losses to dolphins by analyzing data from health assessments (2011, 2013, and 2014), reproductive follow up to those health assessments, analysis of stranding demographics and causes of death, and tissue analysis from stranded dolphins. Quantification of losses is being done by modeling of mark-recapture results to determine population numbers and survivorship over time and reproductive rate over time. Stranding records and hydrodynamic modeling (discussed in “Coastal and Estuarine Cetacean Strandings”) are being used to support mortality rates and model carcass recovery.

We are requesting funds in this Claim to: (1) document mechanisms of injury and refine quantification of losses by: (a) conducting a reproductive follow up to 2014 animals studied in Barataria Bay, (b) conducting one additional live capture health assessment in Mississippi Sound (follow up to 2013 study), (c) conducting genetic analyses for stock assignments for live capture and stranded samples, and (d) updating injury report with findings from all data collected; and (2) conduct and respond to peer review and co-Trustee reviews on quantification of losses.

1. Further documenting mechanisms of injury:

- a. *Reproductive surveys:* Under this current proposal, the Trustees will conduct photographic surveys in Barataria Bay as follow-up to the health assessment conducted in 2014. The photographic studies will be conducted in spring and summer 2015 with the primary purpose being to document reproductive outcomes of the dolphins determined to be pregnant when assessed in summer 2014. Similar surveys completed in 2014 in Barataria Bay and Mississippi Sound (on animals that were captured and assessed in 2013) showed continued reproductive failure, similar to the failure shown by animals assessed in 2011 and followed up in 2012. This suggests ongoing reproductive losses in the northern Gulf of Mexico. Continued follow-up will help quantify the loss or begin to document reproductive recovery in Barataria Bay. Because a health assessment was not conducted in Mississippi Sound in 2014, we are not proposing a reproductive follow-up field effort.
- b. *Health Assessment:* Since 2010, health assessments in oiled areas have been done three times in Barataria Bay (2011, 2013, 2014) and once in Mississippi Sound (2013). Results from satellite tagging in both areas suggest high site fidelity during the life of the tags in both areas, supporting the conclusion that dolphins captured in specific areas would likely have been exposed close to those areas. Multi-year captures in Barataria Bay have allowed us to evaluate the persistence of health and reproductive effects or recovery and incorporate that into injury assessment and quantification. NOAA proposes to do an additional health assessment in Mississippi Sound (an area that had a potentially different degree of oiling than Barataria Bay) to provide a similar assessment of persistence or recovery for an area outside of Barataria Bay.

In 2011, bottlenose dolphin capture-release health assessments were conducted in Barataria Bay, LA, and in Sarasota Bay, FL, to address potential sublethal and/or chronic health impacts of the oil spill. In the summer of 2013, the Trustees conducted additional health assessments in the same two sites (Barataria Bay and Sarasota Bay), as well as in one additional site (Mississippi Sound). Barataria Bay and Mississippi Sound were selected as assessment sites due to oiling that occurred within these areas following the oil spill, with Barataria Bay being the more heavily and persistently oiled site. Sarasota Bay was selected as a comparison site because it did not receive significant DWH oil.

The 2011 health assessment/sample collection and a subset of sample analyses were conducted cooperatively with the RP under the work plan *Assessing Potential Sublethal and Chronic Health Impacts from the Mississippi Canyon 252 Oil Spill on Coastal and Estuarine Bottlenose Dolphins, April 2011*, with follow up for tag assessment and to document outcome of pregnancies in summer of 2012 under the work plan *Assessing Potential Sublethal and Chronic Health Impacts from the Mississippi Canyon 252 Oil Spill on Coastal and Estuarine Bottlenose Dolphins: Addendum, February 2012*. The 2013 work was not conducted under a signed, cooperative work plan, but the field procedures followed were consistent with the 2011 signed plan and the RP participated in 2013 field work and received data. In 2014 one additional health assessment has been conducted non-cooperatively in Barataria Bay (June 2014).

The current proposal is to complete a follow-up live capture health assessment in the summer of 2015 in Mississippi Sound to document mechanisms of injury and track recovery for the stock. Similar to the previous dolphin health assessments, a team of veterinarians, biologists, toxicologists, and epidemiologists will conduct comprehensive health evaluations including a physical examination, diagnostic ultrasound, and blood and tissue sampling for a suite of diagnostic assessments. Dolphins will be captured using established methods and temporarily (usually < 1 hour) restrained for the examination and tissue sampling. Satellite-linked tags will be attached to the dorsal fin of dolphins to obtain location information for up to six months to help elucidate movements of dolphins. Trustees from Louisiana are expected to participate in reproductive follow up studies in Barataria Bay; Mississippi and Alabama Trustees are expected to participate in the Mississippi Sound health assessment.

- c. *Genetics*: For dolphins observed remotely or recovered from strandings, species verification and stock genetics must be conducted through analysis of skin collected from remote dart biopsies (from 2010-2012), biopsies from live captures, or samples from available stranded animals. Genetic analysis of NRDA-collected marine mammal samples was completed for samples collected from 2010 to 2013. These analyses include sex determination, species/ecotype identification, and/or mtDNA and microsatellite analysis for stock structure. Many of the genetics analyses were completed under a cooperative assessment plan *Genetic Analysis of Stock Structure, Species Identification, and Sex Determination for Marine Mammal Biopsies and Strandings*. Analysis of the samples from the 2014 health assessment will be completed by the end of 2014.

The current proposal is to analyze up to 300 skin/blubber samples from the 2015 health assessment and any relevant stranding samples received in the future. Animals will be assessed for sex determination and species/ecotype definition through genetic analysis and/or stock structure through mtDNA analysis and microsatellite analysis. This information will support the scaling of injuries to restoration for marine mammals.

The health assessment study will be conducted over a two-week period in summer 2015 in Mississippi Sound. Dolphins will be captured using established methods, estimating 30 dolphins. The capture fleet will consist of six to seven boats: a net boat, up to five chase boats, and a veterinary processing boat. The field team will consist of approximately 50 experienced personnel including at least three experienced veterinarians, and all field work will be done under a MMPA research permit and Animal Care and Use Committee review issued to Dr. Teri Rowles. Permit reports will be provided as needed to fulfill permit requirements. Laboratory work from health assessments will be completed by the end of 2015.

Analysis of photos from the reproductive surveys (photo-ID surveys) (photo analysis) will be performed using the Finbase database, and photos will be incorporated into the Finbase catalog and will be completed by September 2015.

For the genetics analysis, laboratory analysis will begin in January 2015 as samples are received. Analyses will be complete by October 2015 and associated data delivered to the data warehouse. The number of samples is an estimate, since the actual number of captured animals, remote biopsies, and strandings is unknown.

2. Updating technical documentation based on new results, peer review, co-Trustee review, and evaluation of BP data

With requested funds in this activity and using data management systems like DIVER, our scientists also will begin arranging the full set of final analytical and observational results, final spatial data layers, final metadata, and other final data types to support the public review version of the DARP. An all-inclusive presentation of technical material is vital to support review of the draft DARP by the public. The full presentation of injury assessment results will document all estuarine dolphin injuries and detrimental effects observed across investigations since the Incident began. For example, multiple analysis components or interpretive analysis activities will be accounted for by our team (Marine Mammals work plans listed in Attachment A-3 and in the bullets below):

- ❖ Dolphin capture-release health assessments (Barataria Bay, Mississippi Sound, Sarasota Bay)
- ❖ Reproductive surveys of pregnant females
- ❖ Mark-recapture photo identification surveys of estuarine dolphins
- ❖ Evaluation of dolphin physical examinations, ultrasounds, blood and tissue sample results
- ❖ Analysis of skin or blubber using genetic techniques that were collected from health assessments or remote dart biopsies. Genetic data are used to determine gender, species/ecotype identification, degree of genetic exchange between animals from different geographic areas, and/or mtDNA and microsatellite analysis for stock structure
- ❖ Relevant results from dolphin stranding analyses and experts
- ❖ Animal tracks and associated habitat use analyses from satellite telemetry
- ❖ In-situ and remotely-sensed ocean or estuarine data
- ❖ Distribution and abundance information for dolphins, summarized over space and time
- ❖ Fate and effects modeling results using chemical, biological, physical, and toxicological information
- ❖ Oil on water products derived from remote sensing information
- ❖ Historical/baseline datasets of resource distribution and abundance, life history, habitat conditions, and tagged animal behavior
- ❖ All PI-led technical reports and associated analyses

The result of this activity will be a well-organized and comprehensive set of final technical material that is made available to support the public's review of the draft DARP. Because the volume of scientific information for NRDA is so large and diverse, this all-inclusive data presentation requires substantial coordination among the co-Trustees and Trustee data managers.

Data Handling & Sharing

Funding is requested for a variety of activity-specific data management activities associated with estuarine dolphins. Once datasets are complete and the quality review conducted, the data are published to different repositories external to the NOAA Trustee group. In particular, the data team focuses on posting information for use by the Public. The bulk of the data sharing has been focused on sample and dolphin health assessment results; however, we anticipate also needing to release other types of data in the coming months. Several data sharing tasks are routinely undertaken as new data are available:

- Coordinate the seven-day view period to apprise RP and Trustee leads when new data are pending publication to a public repository;
- Post associated data validation reports to assist RP and Trustee leads in the seven-day view activities;
- Conduct review of data deemed ready for posting to ensure all information has been reviewed and is ready to share; and
- Coordinate with end-user system contacts to ensure new data are represented correctly in the end-user systems.

These data management tasks are necessary to comprehensively maintain and ensure proper document and data preservation and develop consistent data suitable for application in the damage assessment. Through the tracking and integration process, the DMT works to consolidate the information in the case into organized and comprehensive repositories. The tracking of analysis product data usage helps ensure that all individuals are using consistent, up-to-date data products. The effort to maintain the infrastructure for those repositories and conduct quality control of records is represented in separate data management-specific procedures.

We also are requesting funds for the analysis of 300 skin/blubber core samples. The data management process includes coordinating analytical activities; data tracking activities to provide status reports on analytical progress and data availability; third-party validation of lab results to ensure data is in proper format and meets quality standards; secondary QA/QC of field data prior to merging with lab results; incorporation into repositories as final, validated products; forensic chemistry to identify source of contamination; and spatial processing and loading into ERMA.

The routine dolphin health examinations will provide data on morphometric measurements, sampling of blood, urine, feces, blowhole, and blubber as well as a tooth extraction to determine age. Diagnostic ultrasound will also be conducted. Specific routine health parameters to be measured are provided in the table below. In addition, genomic analysis will be conducted using Messenger Ribonucleic Acid extracted from skin and blood. Health data for individual dolphins will be synthesized, and the prevalence of specific disease categories will be determined for each study site (Table 3).

Table 3. Health parameters to be measured from dolphin blood & urine samples

Hematology (Cornell)	Electrophoresis (Cornell)	Serum chemistry (Cornell)	Endocrinology (Blood – Cornell; Blubber – NOAA)	Functional Immunology (UConn)	Urinalysis (on vessel)
Hematocrit	total protein	electrolytes: sodium, potassium, chloride	total thyroxine	T-lymphocyte proliferation	Color
packed cell volume	Albumin	bicarbonate	free thyroxine	B-lymphocyte proliferation	Turbidity
Hemoglobin	alpha 1, alpha 2 & total alpha globulin	anion gap	total triiodothyronine	neutrophil phagocytosis	pH
red blood cell count	beta 1, beta 2 & total beta globulin	urea nitrogen	progesterone (blood & blubber)	monocyte phagocytosis	specific gravity

Hematology (Cornell)	Electrophoresis (Cornell)	Serum chemistry (Cornell)	Endocrinology (Blood – Cornell; Blubber – NOAA)	Functional Immunology (UConn)	Urinalysis (on vessel)
Mean Corpuscular Volume, Mean Corpuscular Hemoglobin, Mean Corpuscular Hemoglobin Concentration	gamma globulin	Creatinine	estradiol	cytokines	Glucose
red cell distribution width		uric acid	aldosterone	respiratory burst	Bilirubin
reticulocyte count		calcium, phosphate, magnesium	testosterone (blood & blubber)		Ketone
white blood cell count & differential: segmented neutrophils, band neutrophils, lymphocytes, monocytes, eosinophils		total protein, albumin, globulin	cortisol (blood & blubber)		Blood
platelet count		Glucose			Protein
plasma appearance		enzymes: succinic dehydrogenase, lactate dehydrogenase, gamma glutamyl transferase, alkaline phosphatase, aspartate aminotransferase, alanine aminotransferase			urobilinogen
Red blood cell morphology, white blood cell exam, parasites		total, direct, & indirect bilirubin			nitrite
		Amylase			leukocytes
		cholesterol, triglycerides			
		creatine kinase			
		iron, total iron binding capacity, saturation			
		lipemia, hemolysis, icterus			

Level of Effort

Our request is for \$1.3M in contract funds and \$1.29M in agency funds. These costs include 4.2 Agency FTEs and 3.0 contract equivalents. Please refer Attachment A-6 for a detailed breakdown of costs.

PIs (NOAA and other)

The PIs associated with this procedure include: Dr. Lori Schwacke, Health Assessment and Photo-ID (NOAA National Centers for Coastal Ocean Science); Dr. Teri Rowles, Health Assessment (NOAA Office of Protected Resources (OPR)); Dr. Keith Mullin, Photo-ID (NOAA NMFS SEFSC); and Dr. Patricia Rosel, Genetics (NOAA).

PIs related to the management of data for this procedure include: Amy Merten (NOAA), Ben Shorr, (NOAA), Daniel Hudgens (IEc), Tyler Vick (MFA), Peggy Myre (Exa), Jay Coady (IMSG), and Jim Anderton (Solea). Attachment A-5 provides further details of PI qualifications.

Administrative Record

The NOAA team will continue to respond to requests for documents to complete the AR. This activity will include providing new documents and data related to new fieldwork and estuarine mammal injury assessment analyses. The costs of the NOAA team in gathering and providing these records for AR purposes is captured here; the costs of capturing and processing these records for AR purposes is captured under the AR Tasks.

Activity 7: Coastal and Estuarine Cetacean Strandings

As stated in the “Estuarine and Coastal Dolphins” section, the analysis of the number of and cause of death for dead stranded dolphins is an integral part of the injury assessment for the marine mammal NRDA for oil spill, along with live animal studies (health assessments, reproductive assessments, and photographic surveys—all covered under the “Estuarine and Coastal Dolphins” activity). This activity describes the collection, temporary storage and analyses of stranded cetaceans (primarily bottlenose dolphins). Costs for data interpretation, updating reports, peer and co-Trustee review, and analysis of BP data are included in “Estuarine and Coastal Dolphins” or “Oceanic Marine Mammals.”

In accordance with the Title IV of the Marine Mammal Protection Act (16 U.S.C. 1421c), a UME has been declared for cetaceans in the northern Gulf of Mexico from February 2010 through the present (NOAA, 2012a). High strandings numbers continue in the northern Gulf of Mexico in 2014, making this the longest-lasting UME in the UME program.

Analyses to date suggest that this UME is not due to any of the common causes of previous Gulf UMEs, such as morbillivirus or biotoxins, and oil cannot be ruled out as a causal effect in cetacean mortalities that have occurred since the Incident. Many stranded dolphins are exhibiting signs of lung, adrenal and other abnormalities similar to those described for live animals assessed in Barataria Bay. As described in the approach above in the section on Estuarine and Coastal Dolphins, and as shown in previous studies on oil impacts from spills, and from laboratory investigations, the impacts of oil exposure can have significant adverse effects on mammal reproduction, health, and mortality. Using a robust system of

evaluation utilizing both live (from health assessments, live strandings, photo ID, aerial surveys, satellite tagging) and stranded dead animals allows us to evaluate the continuum from exposure to poor health (disease) to reproductive failure or death and to identify the processes by which those occur over time. As a result of this integrated approach, the NRDA is evaluating results from the UME investigations for potential oil-related connections to these mortalities.

As a result of the NRDA for the oil spill, the Marine Mammal Stranding Network (MMSN) in the northern Gulf of Mexico has been directed by NOAA to follow strict sampling, necropsy, handling, and documentation protocols for all stranded marine mammals.³ These protocols require the network to collect and handle carcasses and samples differently than their normal operating procedures. These requirements result in additional NRDA-specific costs.

Our request includes support for stranding networks to collect samples to be used in the NRDA and to perform the NRDA-required sample and carcass handling and retention, for database management and for completing pathological and other diagnostic evaluations to determine the types of injuries and changes over time that may be consistent with oil exposure.

Data collected include information that is necessary to determine cause of death, types of lesions or diseases, and to assess potential impacts of the oil spill on coastal/estuarine bottlenose dolphins. In addition, providing rapid response and investigations of neonatal, calf, or pregnant female morbidity and mortality, especially during the peak stranding season from January through April in the northern Gulf of Mexico, is critical to ongoing assessment of reproduction in this population and population impacts and recovery from the oil spill.

Samples and data from strandings in the northern Gulf are of interest to the NRDA. These analyses assist in injury assessment and quantification by evaluating dead dolphins for disease processes with potential links to oil (similar to findings from the live dolphins during the Barataria Bay health assessments) and by evaluating other stressors such as disease or other environmental factors. Starting in 2012 to June 2014, the NRDA has funded analysis of approximately 270 samples from strandings (across all years) for Brucella, 30 for Morbillivirus, and 80 for biotoxins, all commonly associated with strandings. More recent analyses (approximately 190 morbilli samples and 150 biotox samples) are pending. In addition, from 2012 to the present, the NRDA has analyzed samples from over 120 animals (across multiple years)

³ The MMSN was formalized as part of the 1992 amendments to the MMPA, and NOAA NMFS was designated as the lead agency to establish the program and coordinate responses in U.S. waters for all cetaceans and pinnipeds (except walrus). Volunteer participants in the National Marine Mammal Stranding Program exist in all coastal states and territories to respond to marine mammal strandings and are authorized under Section 112c Stranding Agreements from one of the six NOAA NMFS regional offices or under Section 109h (for federal, state, or local government officials who are operating in their official duties) of the MMPA. These MMSN organizations/participants receive no consistent financial support from the federal government for their activities, thus the ability of the MMSN to respond to and investigate strandings can vary by organization, by level of training, by level of other funding, and by year. Participants in the MMSN may apply for Prescott grants in annual competitions or through emergency funds, which do provide limited support for stranding response activities to some MMSN organizations.

for histopathology. Results and interpretations from these laboratory analyses will be included in quantification and injury reports covered in the “Estuarine and Coastal Dolphin” section of this Claim.

Additionally, this request includes stranding database and sample management. Basic information regarding strandings (location, date, time) is collected by the stranding network on national forms completed by the individual stranding agencies (Level A data). These data are entered into a national database (Marine Mammal Health and Stranding Response Program database) and only include the basic stranding information. Given the large temporal and spatial scale of this event, there continues to be a need to add additional fields not typically collected (degree of visible oiling, etc.) and combine these stranding data with tissue tracking and chain of custody information in a single database. Our request is to continue data entry, data validation, and sample tracking, and to integrate these data with the UME analytical results data for easier searching and access for injury assessment efforts. Over 22,000 samples have been entered into the sample tracking database to date. The data entries for tracking these samples are ongoing, and samples are still being collected and shipped for analyses. This activity requires funding to continue data entry, data validation, data integration, data and sample tracking, and data assessment and comparisons to historic data.

This request also covers sample and carcass tracking, short-term carcass storage, sample storage, documentation, and shipping.

Counts, demographics, and spatio-temporal distribution of stranded dead animals are being incorporated into modeling to assist in quantifying mortality after the oil spill for both the estuarine and coastal dolphins, but also for oceanic marine mammals. Modeling for these efforts has been covered in past IPCs. Costs for peer review, Trustee review and responding to review comments are covered in the “Estuarine and Coastal Dolphin” and “Oceanic Marine Mammal” sections.

Connection to NRDA Process

Presently, exposure to MC252 oil cannot be ruled out as a contributor to mortality under the UME. As noted previously and as funded in previous years, actual mortality data is a critical component in understanding the continuum from oil exposure through various disease processes, as outlined above in estuarine dolphins, to death. Stranding data continue to be one of the critical lines of evidence that may be used to develop the injury assessment for coastal and estuarine dolphins as the longer term consequences of oil exposure are recognized.

Data Handling & Sharing

Samples will continue to be collected from stranded animals and managed under chain of custody and coordinated by the DMT as outlined above. Field sample data sheets will be maintained by the NOAA National Marine Fisheries Service (NMFS) SEFSC under chain of custody and entered into the stranding database. Data management activities are required to manage, statistically analyze, and map the data collected under this activity. Samples and associated data acquired through cooperative work plans will be collected through methods defined in joint signed protocols. These samples will be analyzed and the data will be tracked, organized, and QA/QC'd by NOAA. These data, along with associated documentation such as validation reports, are maintained by NOAA's DMT and will be distributed to Trustee representatives through NRDA and cooperative databases.

As data related to this procedure are integrated into the system repositories, the DMT conducts quality reviews to promote consistent data suitable for application in the injury assessment and other technical documentation. These quality reviews range from basic standardization efforts (e.g., making spelling changes to misspelled species names) to complex lab analysis validation by a third-party lab validation specialist.

Typical reviews for new field collections and newly produced/shared results include:

- Confirming transcribed latitude and longitude coordinates based on Global Position System (GPS) data collected
- Coordinating with stranding network and Technical Working Group (TWG) leads to review suggested coordinate changes and, when approved, make the necessary system updates
- Tracking the link between sample and observation data to ensure that any standardization changes are made consistently across both datasets
- Standardizing depth information, such as units
- Standardizing species name and associated taxonomic hierarchy information
- Performing third-party validation for analytical chemistry samples
- Conducting final review of integrated field and lab result data for record completeness and accuracy prior to posting to Query Manager
- Reviewing processed instrument data for completeness and accuracy
- Reviewing analysis products to promote proper use of all applicable data and identifying any necessary updates

Funding is requested to maintain and share with co-Trustees large amounts of dolphin stranding data. Once data records are complete and the quality review conducted, the data are published to different repositories external to the NOAA Trustee group. In particular, the data team focuses on posting information for use by the public. The bulk of the data sharing has been focused on sample results; however, we anticipate also needing to release observation and other data collected in the coming months. Specific tasks may include, as relevant:

- Coordinate the seven-day view period to apprise RP and Trustee leads when new data are pending publication to a public repository;
- Post associated data validation reports to assist RP and Trustee leads in the seven-day view activities;
- Conduct review of data deemed ready for posting to ensure all information has been reviewed and is ready to share; and
- Coordinate with end-user system contacts to ensure new data are represented correctly in the end-user systems.

These data management tasks are necessary to comprehensively maintain and ensure proper document and data preservation and develop consistent data suitable for application in the damage assessment. Through the tracking and integration process, the DMT works to consolidate the information in the case into organized and comprehensive repositories. The tracking of analysis product data usage helps ensure that all individuals are using consistent, up-to-date data products. The effort to maintain the infrastructure

for those repositories and conduct the quality control for records is represented in separate data management-specific procedures.

Level of Effort

Our request is for \$2.08M in contract funds and \$499,500 in agency funds. These costs include 1.1 Agency FTEs and 3.2 contract equivalents. Please refer Attachment A-6 for a detailed breakdown of costs.

PIs (NOAA and other)

The PIs associated with this procedure include: Dr. Teri Rowles (NOAA OPR), Dr. Erin Fougères (NOAA SE OPR), Dr. Jenny Litz (NOAA SEFSC), and Dr. Lance Garrison (NOAA SEFSC).

PIs related to the management of data for this procedure include: Amy Merten (NOAA), Ben Shorr, (NOAA), Daniel Hudgens (IEc), Tyler Vick (MFA), Peggy Myre (Exa), Jay Coady (IMSG), and Jim Anderton (Solea). Attachment A-5 provides further details of PI qualifications.

Administrative Record

The NOAA team will continue to respond to requests for documents to complete the AR. This activity will include providing new documents and data related to cetacean strandings. The costs of the NOAA team in gathering and providing these records for AR purposes is captured here; the costs of capturing and processing these records for AR purposes is captured under the AR Tasks.

Activity 8: Oceanic Marine Mammals

NOAA's Third IPC described the PI-led injury assessment report being developed by the end of 2014. NOAA and BP received the final sperm whale telemetry data in May 2014, and one set of passive acoustic data in April 2014. We are still awaiting an acoustic report from Scripps Institute of Oceanography, expected sometime in Fall 2014. The injury assessment and quantification are integrating information from these studies as well as surface oil, inhalation assessment, shipboard surveys and the stranding record.

With requested funds in this activity and using data management systems like DIVER, our scientists will begin arranging the full set of final analytical and observational results, final spatial data layers, final metadata, and other final data types to support the public review version of the DARP. An all-inclusive presentation of technical material is vital to support review of the draft DARP by the public. The full presentation of injury assessment results will document all oceanic dolphin injuries and detrimental effects observed across investigations since the Incident began. For example, multiple analysis components or interpretive analysis activities will be accounted for by our team (Marine Mammals work plans listed in Attachment A-3 and in the bullets below):

- ❖ All sperm whale telemetry results and associated habitat use, home range, and behavior analyses, including information from skin biopsies
- ❖ All acoustic whale/marine mammal survey results from shipboard surveys and passive acoustic arrays

- ❖ Modeling results and field observations important for the inhalation injury assessment
- ❖ In-situ and remotely-sensed ocean data
- ❖ Distribution and abundance information for oceanic marine mammals (from transect surveys), summarized over space and time
- ❖ Fate and effects modeling results using chemical, biological, physical, and toxicological information, including effects to prey
- ❖ Oil on water products derived from remote sensing information
- ❖ Historical/baseline datasets of resource distribution and abundance, life history, habitat conditions, and tagged animal behavior
- ❖ External peer review of draft DARP sections and evaluation of relevant BP data
- ❖ All PI-led technical reports and associated analyses

The result of this activity will be a well-organized and comprehensive set of final technical material that is made available to support the public's review of the draft DARP. Because the volume of scientific information for NRDA is so large and diverse, this all-inclusive data presentation requires substantial coordination among the co-Trustees and Trustee data managers.

Data Handling and Sharing

This activity will culminate with an injury quantification for oceanic marine mammals that is integrated into the draft DARP. Once all data records for oceanic marine mammals are complete and the quality review conducted, the data are published to different repositories external to the NOAA Trustee group. In particular, the data team focuses on posting information for use by the public. We will coordinate with end-user system contacts to ensure oceanic marine mammal data are represented correctly in the end-user systems. Specific tasks may include, as relevant:

- Coordinate the seven-day view period to apprise RP and Trustee leads when new data are pending publication to a public repository;
- Post associated data validation reports to assist RP and Trustee leads in the seven-day view activities;
- Conduct review of data deemed ready for posting to ensure all information has been reviewed and is ready to share; and
- Coordinate with end-user system contacts to ensure new data are represented correctly in the end-user systems.

These data management tasks are necessary to comprehensively maintain and ensure proper document and data preservation and develop consistent data suitable for application in the damage assessment. Through the tracking and integration process, the DMT works to consolidate the information in the case into organized and comprehensive repositories. The tracking of analysis product data usage helps ensure that all TWGs are using consistent, up-to-date data products. The effort to maintain the infrastructure for those repositories and conduct the QC for the records is represented in separate data management-specific procedures.

Level of Effort

Our request is for \$339,200 in contract funds and \$257,500 in agency funds. These costs include 0.9 Agency FTEs and 0.9 contract equivalents. Please refer Attachment A-6 for a detailed breakdown of costs.

PIs (NOAA and other)

The PIs associated with this procedure include: Dr. Lance Garrison (NOAA) and Dr. Jenny Litz (NOAA).

PIs related to the management of data for this procedure include: Amy Merten (NOAA), Ben Shorr, (NOAA), Daniel Hudgens (IEc), Tyler Vick (MFA), Peggy Myre (Exa), Jay Coady (IMSG), and Jim Anderton (Solea). Attachment A-5 provides further details of PI qualifications.

Administrative Record

The NOAA team will continue to respond to requests for documents to complete the AR. This activity will include providing new documents and data related to oceanic marine mammal analyses. The costs of the NOAA team in gathering and providing these records for AR purposes is captured here; the costs of capturing and processing these records for AR purposes is captured under the AR Tasks.

Nearshore Aquatic Habitat and Resource Investigations

E. Shoreline

Activity 9: Completion of Shoreline Injury Quantification

The following indented sections briefly describe previously-funded components of our shoreline injury evaluation:

Shoreline Oiling: Trustees developed a comprehensive set of shoreline oiling data compiling information from a series of datasets characterizing the nature and extent of shoreline oiling. The geospatial database combines shoreline oiling datasets collected by response and NRDA groups, including Shoreline Cleanup Assessment Technique and NRDA rapid assessment data. These data were compiled in several deliverables contained in a spatial database for use with Geographic Information System software. These data consist of unique shoreline segments with attributes summarizing the surface and subsurface observational oiling category, timeline, and character and habitat of that segment. Additional components describe shoreline fetch, wave exposure, aspect, and geometry. These data may be used to generate maps and calculate summary statistics to assist in quantifying and understanding the scope, extent, and spatial distribution of shoreline oil exposure as a result of the Incident.

Coastal Wetland Vegetation: The Trustees are using the coastal wetland vegetation study to assess injury to coastal marshes and mangroves resulting from exposure to MC252 oil. The workplan for this effort, *Sampling and Monitoring Plan for the Assessment of MC252 Oil Impacts to Coastal Wetland Vegetation in the Gulf of Mexico* (coastal wetland vegetation plan), describes

the study methodology in detail. The coastal wetland investigations are designed to detect changes in primary production, reproduction, and soil function. Data have been collected across five sampling seasons (fall 2010, spring 2011, fall 2011, fall 2012, and fall 2013) in Louisiana and across four sampling seasons (spring 2011, fall 2011, fall 2012, and fall 2013) in Mississippi and Alabama. Sampling sites represent a spectrum of oiling conditions (including sites where no oil was observed) and a variety of coastal wetland vegetation habitat types (including mainland herbaceous salt marsh, back barrier herbaceous salt marsh, coastal mangroves, and *Phragmites*). A total of 200 sites have been sampled. At many of these sites, multiple “zones” have been sampled at various distances from the marsh edge (e.g., edge, middle, and furthest inland, with the furthest inland zone located at the inland boundary of observed oiling), resulting in the study of more than 500 zones. At each zone, field observation and measurement data have been collected. Key metrics include: visual measures of oiling, vegetative condition (based on degree of chlorosis), percent live and dead vegetative cover, canopy height, chlorophyll content, light adapted fluorescence, and elevation, among others. Soil and vegetative biomass samples have also been collected from each zone for a variety of metrics, including PAHs and chemical fingerprinting, sediment grain size, soil bulk density, soil organic matter, nutrients, and extractable elements. Field collection methods are based on standard methods published in peer-reviewed journals and standard NRDA methods. Laboratory methods are standard methods used by academic or commercial laboratories. These field and lab measurements allow for an evaluation of a range of ecological services, including primary production, provision of marsh habitat, marsh sustainability (i.e., resilience to land loss), and soil function.

Initial data analyses have indicated adverse impacts (for metrics such as vegetative health, biomass, and percent vegetative cover) to coastal wetland vegetation in oiled areas compared to unoiled areas, particularly in heavily oiled areas and when the oiling was persistent in nature. Greater adverse impacts to the vegetation have also been observed along the marsh edge, compared to the marsh interior.

Coastal Wetland Fauna: The potential effects of oiling on fiddler crabs and marsh periwinkles will be used to represent effects on secondary production more broadly in salt marsh communities and will complement the assessment of effects on vegetation. The fiddler crab and marsh periwinkle are good indicator species because of their abundance, importance to the marsh community and food web, and sensitivity to oil. Under the work plan *Work Plan for MC252 Oil Impacts to Fiddler Crabs and Periwinkles along the Gulf of Mexico*, faunal data were collected in fall 2011 at 41 herbaceous salt marsh sites along the Louisiana coast. Sites included unoiled and heavily oiled locations adjacent to established coastal wetland vegetation sites. In addition to these two oiling categories, a third category included sites that were previously heavily oiled but were cleaned up under the DWH response. At each of these sites, three zones were sampled at various distances from the marsh edge (edge, middle, and furthest inland, with the further inland zone located just outside the region of observed oiling). At each zone, field observations and measurement data were collected. More than 100 types of data were collected for each zone, resulting in more than 60,000 individual data elements. Field collection methods were based on standard methods published in peer-reviewed journals. Periwinkle abundance was lower at the heavily oiled sites (both treated and untreated) compared to the unoiled sites. Data from the fall 2011 sampling will be interpreted in combination with the results of laboratory toxicity testing

and several non-NRDA studies. A report will include data interpretation and an evaluation of recovery. The degree and spatial extent of injuries to coastal wetland fauna over time will be used in conjunction with the coastal wetland vegetation injury assessment to determine restoration projects of sufficient magnitude to compensate for lost ecological services.

Shoreline Change: Loss of substrate and structure of wetland habitat is an important component of the injury assessment for coastal wetlands. Vegetation stabilizes soil and helps minimize loss due to waves and wind. Loss of vegetation along the marsh edge due to oiling may render areas vulnerable to erosion. Accelerated erosion due to oiling is of significant concern in light of current loss of wetlands in Louisiana. Coastal wetland vegetation sites are located across Louisiana, Mississippi, and Alabama. In Louisiana, sites were established in fall 2010. In subsequent resampling in 2011, site erosion was documented. Therefore, Trustees are interested in determining erosion as another component of shoreline injury.

Various datasets have been collected to evaluate potential erosion. Real Time Kinematic elevation surveys were conducted in association with 150 Louisiana coastal wetland vegetation sites. The Real Time Kinematic surveys provide horizontal and vertical coordinate data along a specified transect. These data characterize geomorphology and the elevation of substrate and coastal wetland vegetation at specific sites. Repeated surveys provide data on topographic changes at the coastal wetland vegetation edge. The first survey was conducted November 2010 through June 2011. These sites were resurveyed in 2012 (April – May) and 2013 (March – May). Light Detection and Ranging data were acquired in spring of 2011 in oiled and reference areas in Louisiana. The Light Detection and Ranging data allow for the mapping of elevation and shoreline position continuously along impacted and reference shorelines. In addition, the RP funded acquisition of aerial imagery, which is suitable for shoreline mapping and change analysis, during the fall of 2010, the spring/fall of 2011, spring of 2012, pre/post Isaac in the fall of 2012, spring/fall 2013, and spring 2014. BP independently collected shoreline staking data at the Louisiana coastal wetland vegetation sites in the fall of 2011, spring of 2012, and fall of 2012.

These datasets provide shoreline change information that will be used to determine to what extent and for how long coastal wetlands are experiencing land loss due to oiling.

Marsh Response Injury: As part of the response to the continued release of oil from the DWH well blowout, protection strategies were used at priority protection areas in area contingency plans and other sensitive areas identified during the response. Most of the protection efforts involved deployment of “hard” boom (floating barrier with a skirt below the surface and freeboard above the surface to contain or divert the oil) and “soft” boom (round sorbent material that floats on the surface). During the passage of storms in early July 2010, many of these booms became stranded on the shoreline throughout Louisiana, Mississippi, Alabama, and Florida, with the bulk of the strandings in sensitive salt marsh and mangrove habitats in Louisiana. A study was conducted to: 1) document the types of injuries from stranded boom and boom removal operations, and 2) estimate the number, location, and areal footprint of stranded boom in emergent marshes, mangroves, and other wetland environments. A comprehensive evaluation was conducted of available stranded boom across all shorelines where boom was deployed.

With requested funds in this activity and using data management systems like DIVER, our scientists also will begin arranging the full set of final analytical and observational results, final spatial data layers, final metadata, and other final data types to support the public review version of the DARP. An all-inclusive presentation of shoreline technical material is vital to support review of the draft DARP by the public. The full presentation of injury assessment results will document all injuries and detrimental effects observed across shoreline investigations since the Incident began. For example, multiple analysis components will be accounted for by our team (Shoreline work plans listed in Attachment A-3 and in the bullets below):

- ❖ Shoreline oiling database, with results from Response Phase and NRDA
- ❖ All field results for coastal wetland vegetation and faunal studies. Key vegetative metrics include: visual measures of oiling, aboveground biomass, percent live and dead vegetative cover, vegetative condition (based on degree of chlorosis), canopy height, and elevation, among others. Key faunal metrics include: periwinkle densities and size, as well as fiddler crab burrow densities and species/sex composition. Soil and vegetative biomass samples have been collected for a variety of metrics, including polycyclic aromatic hydrocarbons (PAHs) and chemical fingerprinting, sediment grain size, soil bulk density, soil organic matter, nutrients, and extractable elements.
- ❖ All results from shoreline change studies, including Real Time Kinematic/Light Detection and Ranging evaluations.
- ❖ Analysis results for nearshore sediment samples
- ❖ Analysis results for marsh edge/sandy shore biota samples, including PAH forensics
- ❖ Nearshore fish and benthic sampling, including prey species
- ❖ All results from submerged aquatic vegetation investigations, including analysis of high-altitude aerial images to determine injuries from propeller and boom scars attributable to response activities.
- ❖ All results for studies designed to assess injuries to marshes from Response Activities
- ❖ Use of relevant toxicity test results to understand effects of oil exposure to nearshore species and relevant injury endpoints
- ❖ Incorporation of model results to estimate the foregone production of nearshore species
- ❖ Nearshore benthic habitat and shoreline oiling characterization across large areas of the Gulf of Mexico
- ❖ Prepare final metadata for sampling efforts
- ❖ All spatial data and modeling information pertinent to nearshore benthic habitat and shoreline analyses, including a large number of maps to describe the spatial extent, duration, and severity of oiling
- ❖ Historical/Baseline photo and imagery review
- ❖ All PI-led technical reports and associated analyses

The result will be a well-organized and comprehensive set of final technical material that is made available to support the public's review of the draft DARP. Because the volume of scientific information for NRDA is so large and diverse, this all-inclusive data presentation requires substantial coordination among the co-Trustees and Trustee data managers.

Data/Deliverables Produced

Once shoreline data records are complete and the quality review conducted, the data are published to different repositories external to the NOAA Trustee group. We will coordinate with end-user system contacts to ensure all shoreline data are represented correctly in the end-user systems. Specific tasks may include, as relevant:

- Coordinate the seven-day view period to apprise RP and Trustee leads when new data are pending publication to a public repository;
- Post associated data validation reports to assist RP and Trustee leads in the seven-day view activities;
- Conduct review of data deemed ready for posting to ensure all information has been reviewed and is ready to share; and
- Coordinate with end-user system contacts to ensure new data are represented correctly in the end-user systems.

In particular, at least four categories of injury assessment information are envisioned to be shared among Trustees: (1) Updated shoreline change analyses; (2) Updated coastal wetland vegetation assessment; (3) Updated faunal assessment; and (4) Updated marsh response injury.

These data management tasks are necessary to comprehensively maintain and ensure proper document and data preservation and develop consistent data suitable for application in the damage assessment. Through the tracking and integration process, the DMT works to consolidate the information in the case into organized and comprehensive repositories. The tracking of analysis product data usage helps ensure that all TWGs are using consistent, up-to-date data products. The effort to maintain the infrastructure for those repositories and conduct the QC for the records is represented in data management-specific procedures.

Level of Effort

Our request is for \$382K in contract funds and \$519,000 in agency funds. These costs translate to 1.0 contract equivalents for technical experts (subcontracted under IEC), and shoreline-focused contract support from IEC. The funds will support more than 15 scientists, subject matter experts, and data managers. The costs include 1.9 agency FTE equivalents. Please refer Attachment A-6 for a detailed breakdown of costs.

Injury Assessment Contract PIs

Dr. James Gibeaut (Texas A&M) is the PI for shoreline change. Dr. Mark Hester (University of Louisiana, Lafayette) is the lead PI for the coastal wetland vegetation study along with Dr. Jonathan Willis (University of Louisiana, Lafayette). Dr. Jacqueline Michel and Zach Nixon, both of Research Planning Incorporated (RPI), are the PIs for marsh response injury. Zach Nixon (RPI) is the PI for developing the shoreline oiling exposure database. Dr. Sean Powers of Dauphin Island Sea Lab is a PI for the coastal wetland faunal assessment, with peer reviewing assistance from Dr. Steven Pennings (University of Houston) is a peer reviewer for the coastal wetland faunal assessment. Dr. Scott Zengel (RPI) is a PI for the coastal wetland faunal analysis. Dr. Shahrokh Rouhani (NewFields) provides statistical analysis support across all aspects of the shoreline portfolio.

PIs related to the management of data for this procedure include: Jim Anderton (Solea), Daniel Hudgens (IEc), Peggy Myre (Exa), and Tyler Vick (MFA). Attachment A-5 provides further details of PI qualifications.

Administrative Record

The NOAA team will continue to respond to requests for documents to complete the AR. This activity will include providing new documents and data related to the preparation of the draft shoreline section in the DARP. The costs of the NOAA team in gathering and providing these shoreline records for AR purposes is captured here.

F. Oysters

NOAA requests funding to implement fieldwork, continue coordination with co-Trustees, continue data verification on observational and laboratory data, support data management activities (specific to oysters), complete injury analyses incorporating all data collected, and support injury scaling analyses for oysters.

In the Third IPC, submitted to the NPFC on October 30, 2013, we stated that preliminary data observed to date suggested an extended injury period with little evidence of recovery in the oyster population. Recent preliminary abundance and recruitment data from samples collected in 2013 continue to show extremely low levels of abundance and recruitment in oyster populations across the north central Gulf of Mexico. Over four years following the Incident, zero to low recruitment and abundance continue to be seen across the footprint of the oil spill as well as in areas affected by the 2010 freshwater diversions opened by the state of Louisiana as part of response activities. This continued lack of recovery extends well beyond what would be expected following a significant freshwater event. The persistence of low recruitment and abundance several years after the Incident is unlikely due solely to impacts of freshwater exposure. In addition, laboratory testing of oil toxicity performed under the NRDA has shown that very low concentrations of oil kill oyster larvae, prevent normal fertilization from occurring, and produce developmental abnormalities in embryos and free-swimming larvae that ultimately lead to death. Because we have yet to see signs of recovery in oyster reproduction or abundance following the oil spill, a strong need exists for continued field measurement in 2015 in order to assess the temporal and spatial extent of diminished oyster resources, and to detect and document the recovery trajectory for these resources in the Gulf of Mexico when recovery begins. Although a preliminary injury quantification is being prepared in 2014 to inform development of the DARP, data collected through fall of 2015 are needed and will be used to refine and extend injury estimates as part of the Trustees' injury determination (§990.51) and quantification (§990.52) activities. Observations of low abundance of juveniles and adult oysters as well as low recruitment of oyster spat in 2013 lead NOAA to expect that recovery of the Gulf oyster populations will take at least several more years. Continued assessment of oyster populations across multiple life stages is critical in determining the temporal extent of ongoing injury. Furthermore, continued sampling will allow Trustees to better understand the spatial extent of recovery.

This document describes three fieldwork activities and a Completion of Oyster Injury Quantification task. Both the fieldwork and the completion of claim tasks are necessary to finalize our injury assessment and inform restoration activities. Fieldwork tasks include collection of data to assess subtidal oyster abundance and biomass; subtidal oyster recruitment assessment work; and nearshore oyster assessment

work. Each of the fieldwork tasks will result in a new dataset. These data will be fully QC'd and analyzed. The results will be incorporated into an injury assessment model as part of the Completion of Oyster Injury Quantification task. This task includes work necessary to incorporate the results of the new oyster assessment studies into a model that can be used to quantify the overall injury to oyster resources and the loss of ecological services that resulted from that injury.

Oyster Fieldwork

We are proposing the following three fieldwork activities targeting oysters in 2015:

1. Continued Assessment of Subtidal Oyster Injury – Abundance and Biomass;
2. Continued Assessment of Subtidal Oyster Injury – Recruitment; and
3. Continued Assessment of Nearshore Oyster Injury.

PIs (NOAA and Other)

Dr. Sean Powers is the PI who will oversee data collection, laboratory analyses, data analyses, and injury estimation and quantification across all oyster tasks detailed in this Claim. He is a professor and chair of the Department of Marine Sciences at the University of South Alabama, and a senior marine scientist at the Center for Ecosystem Based Fisheries Management at the Dauphin Island Sea Lab. He has been the lead oyster biologist advising and overseeing the Oyster TWG sampling activities since the start of the DWH NRDA injury assessment. He directs the fisheries ecology lab at Dauphin Island Sea Lab, which is responsible for 1) analyzing oyster quadrats for abundance and biomass of oysters and related fauna, 2) analyzing settlement plates for oyster spat counts, and 3) performing gonadal and condition index analyses on oysters. In addition, Dr. Powers will play a key role in advising the design of sampling activities as well as in revising the interpretive report of exposure and injury based on new data.

Dr. Jonathan Grabowski is an associate professor of biology at Northeastern University. Dr. Grabowski works with Dr. Powers in all aspects of the oyster injury estimation and quantification. He provides key guidance on sampling activities and data analyses performed by the NOAA oyster team.

Other key personnel include: Ian Zelo (NOAA), the oyster TWG lead; Henry Roman (IEc), the primary NOAA contractor for managing oyster field collection efforts and analytical work; Dr. Lyman McDonald, the lead statistician for the oyster TWG at WEST, Inc., who oversees all statistical work, including statistical analyses of NRDA and non-NRDA data, statistical design of sampling plans, and verification of observational and laboratory datasets; and Dr. Shahrokh Rouhani, the lead statistician at NewFields.

PIs related to the management of data for this procedure include: Amy Merten (NOAA), Ben Shorr, (NOAA), Daniel Hudgens (IEc), Tyler Vick (MFA), Peggy Myre (Exa), Jay Coady (IMSG), and Jim Anderton (Solea). Attachment A-5 provides further details of PI qualifications.

Activity 10: Continued Assessment of Subtidal Oyster Injury (Abundance and Biomass)

Under this activity, NOAA will generate a dataset of abundance, biomass, and oyster mortality levels in 2015 for spat, seed, and market-sized oysters in subtidal habitats in Louisiana, Mississippi, Alabama, and Florida. Assessment results from 2015 will be analyzed and added into models of exposure and injury to

subtidal oyster resources which will refine oyster injury determination and injury quantification. NOAA and its contractors oversee every aspect of these field sampling efforts. NOAA coordinates with co-Trustees to ensure the presence of both federal and state representatives in the field. States may also provide vessels and equipment necessary to complete fieldwork.

In 2010 and 2011, the Trustees and the RP developed cooperative work plans to assess oyster injury in subtidal zones through the collection of oyster abundance and biomass. In 2012 and 2013, Trustees continued to sample subtidal areas for abundance and biomass. Although the RP paid for these plans, the RP did not participate in fieldwork. The Third IPC provides funding for abundance sampling in August of 2014 to assess whether recovery of oyster populations is beginning in 2014. The NOAA oyster team will oversee the collection of subtidal abundance and biomass data in field sites across Louisiana, Mississippi, Alabama, and Florida. This field work will begin in July of 2014 and be completed by early fall. Additionally, NOAA was granted funding under this Claim to perform preliminary assessment of 2014 data and refine analyses of abundance and biomass data collected since 2010. The NOAA oyster team has finished performing QA/QC of the subtidal abundance dataset through 2013 and is coordinating with data management to ensure that field and laboratory data are integrated into DIVER. The NOAA oyster team expects to be completed with preliminary injury assessment of subtidal abundance and biomass through 2013 by the end of 2014. While we have not collected or analyzed 2014 abundance data yet, the NOAA team believes strongly that continued assessment of abundance and biomass is warranted in 2015 based on the data collected through 2013 and our understanding of the oyster life cycle and recovery rates.

Given the conditions we observed in 2013, multiple years of good recruitment would need to occur to achieve recovery of oyster abundance. Sampling in 2015 is needed because even if good recruitment is observed in 2014, one year of recovery data would not be sufficient to calculate the recovery curve necessary to quantify injury. Continued assessment of adult, spat, and seed oysters is a critical component in the quantification of the continuing oyster injury from the DWH Incident and is absolutely necessary to inform a determination of restoration needed to compensate for injuries.

In 2010, data collected under a cooperative work plan showed that a large number of stations (roughly half) indicated low to very low abundance of market-size, spat-size, and seed-size oysters, particularly at the stations in upper Barataria Bay, Breton Sound, Mississippi Sound, and Mobile Bay. These areas had recently dead oysters present. In both 2011 and 2012, a greater number of stations indicated low to very low abundance in Louisiana, Mississippi, and Alabama, and recently dead oysters were only observed in a limited number of stations. Preliminary data analysis of 2013 abundance results shows the continuation of zero to very low abundance counts across much of the Gulf and failure of oyster populations to recover. Preliminary data analysis suggests that abundance may be decreasing across the north-central Gulf, especially in the footprint of the DWH oiling footprint. Analysis of larval settlement patterns shows widespread recruitment failure in 2010, 2011, 2012, and 2013, suggesting ongoing reproductive difficulties for the four years following the Incident. We believe these difficulties may be suppressing oyster abundances across the north-central Gulf and may be contributing to an ongoing failure of recovery. Oyster populations continue to show almost no new recruitment through 2013 in areas potentially affected by the Incident. This signals the possibility that the Gulf may face low oyster abundance for many years. Continued assessment of oyster abundance and biomass provides critical information on the duration of this extended injury and whether the population will eventually recover to baseline levels.

We are proposing to sample all 149 subtidal sites which were sampled in 2011, 2012, 2013, and 2014 for abundance and biomass. Sampling at the full suite of sites allows for sufficient statistical power to detect significant differences in abundance and biomass. The low abundance counts in past years, including the extremely low abundances found across much of the Gulf in 2013, further justify sampling at the full complement of sites used in past years. Additionally, we propose abundance and biomass sampling at 20 new sites across the north-central Gulf. Selecting 20 sites with oyster resource may require mapping up to 30 new locations. This additional work will allow the Trustees to assess the continued representativeness of sites that have been repeatedly sampled since 2010. In total, abundance and biomass will be sampled at 169 sites and enumerated by size category at a contract lab (Dauphin Island Sea Lab) using the same protocols as previous oyster abundance and biomass sampling efforts. The products of this work plan include verified datasets of subtidal oyster abundance and biomass for incorporation in our oyster injury estimation and quantification.

Sampling will begin with a two-day, in-person training for field samplers covering assessment plan standard operating practices and NRDA sample collection guidelines. This training will be led by NOAA contractors and attended by both federal and state representatives. This task also requires funds for field sampling support, technical support from Dauphin Island Sea Lab, contractor-provided project management support, oyster specialists, statisticians, data management support, sample preparations and shipping support, observational and laboratory-generated data QA/QC, and vessels.

Also with requested funds in this activity and using data management systems like DIVER, our scientists also will begin arranging the full set of final analytical and observational results, final spatial data layers, final metadata, and other final data types to support the public review version of the DARP. An all-inclusive presentation of technical material is vital to support review of the draft DARP by the public. The full presentation of injury assessment results will document all injuries and detrimental effects observed across oyster abundance investigations since the Incident began. For example, multiple analysis components or interpretive analysis activities will be accounted for by our team (Oysters work plans in Attachment A-3 and in the bullets below):

- ❖ Oyster abundance, biomass, and mortality levels for spat, seed, and market-sized oysters (quadrats)
- ❖ Analysis results and forensic evaluation of nearshore sediment samples
- ❖ Use of relevant toxicity test results to understand effect of oil exposure to oysters
- ❖ Incorporation of model results to estimate oyster injuries, including relevant water quality models and nestier tray survival models
- ❖ In addition to oyster habitat characterization, use of nearshore benthic habitat and shoreline oiling characterizations across large areas of the Gulf of Mexico
- ❖ Final metadata for sampling efforts
- ❖ All spatial data and modeling information pertinent to oyster abundance, biomass, and mortality evaluations
- ❖ All PI-led technical reports and associated analyses

The result will be a well-organized and comprehensive set of final technical material that is made available to support the public's review of the draft DARP. Because the volume of scientific information for NRDA is so large and diverse, this all-inclusive data presentation requires substantial coordination among the co-Trustees and Trustee data managers.

Data Management and QA/QC

As part of the abundance and biomass field collection effort, NOAA and its contractors will oversee data management and data QA/QC work to ensure the validity of field-collected information, including coordinating with co-Trustees on data verification efforts. The end result of this process will be a fully verified dataset of 2015 abundance data. This subtask includes the following activities:

- Developing data documentation protocols (e.g., Sample ID naming convention, file naming convention, photo documentation)
- Training data managers and other cruise staff on use of various field collection forms and documents
- Facilitating uploading of field data and associated files (e.g., chains of custody) to noaanrda.org data repository
- Entering and transcribing data from field forms
- Conducting initial QC of field sampling data
- Processing of field sampling and/or observation data into NOAA data systems
- Managing lab analysis priorities through regular coordination with analytical laboratories
- Responding to various DMT questions during field sampling, data upload, and data sharing activities
- Completing QA/QC (validation) of both observational and laboratory data to result in a fully validated 2015 abundance dataset

As raw field data are validated and finalized, data support activities will also extend to the sharing of these results with the public and BP. Data support activities will include the packaging, organization, and release of each data product along with associated metadata. Associated data storage and transfer costs as well as response to public inquiries are incorporated. Furthermore, the files associated with interim and final products generated through the processing and analysis of field and other collected data will be managed and shared in the NOAA data repositories to promote Trustee-wide data access.

Connection to NRDA Process

This activity will enable the Trustees to quantify injury and integrate exposure, pathway, and injury information for subtidal oysters by producing estimates of changes in abundance and biomass following the Incident and the extent of time the injury persists. The assessment component continues the work of previous NRDA oyster abundance and biomass sampling plans and is critical to assessing the injury and to detecting and determining the recovery trajectory of oyster resources following the Incident. Collection of these data is critical to maintaining our continuous record of subtidal oyster abundance data since the Incident.

Data/Deliverables Produced

The deliverables of this work plan are verified datasets of subtidal oyster abundance and biomass for incorporation in our oyster injury estimation and quantification. After sampling is complete, NOAA and co-Trustees will conduct data verification activities to ensure the quality of our field and laboratory data and will produce a final dataset ready to be integrated into the Trustees' analyses of injury estimation and

quantification. Using data collected in 2015, Trustees will be able to develop strategies for and focus oyster reef restoration activities in areas where restoration may most likely contribute to recovery of areas that show continued low abundance and biomass.

This procedure will require support from the DMT, who coordinates with the oyster TWG to understand the flow of information and provide support in integrating the data into the case tools.

As data related to this procedure are integrated into the system repositories, the DMT conducts quality reviews to promote consistent data suitable for application in the injury assessment and other technical documents. These quality reviews range from basic standardization efforts (e.g., making spelling changes to misspelled species names) to complex lab analysis validation by a third-party lab validation specialist.

Typical reviews for new field collections and newly produced/shared results include:

- Confirming transcribed latitude and longitude coordinates based on GPS data collected
- Coordinating with TWG leads to review suggested coordinate changes and, when approved, make the necessary system updates
- Tracking the link between sample and observation data to ensure that any standardization changes are made consistently across both datasets
- Standardizing depth information, such as units
- Standardizing analyte names and reported units
- Standardizing species name and associated taxonomic hierarchy information
- Performing third-party validation for analytical chemistry samples
- Conducting final review of integrated field and lab result data for record completeness and accuracy prior to posting to Query Manager
- Reviewing processed instrument data for completeness and accuracy
- Reviewing analysis products to promote proper use of all applicable data and identifying any necessary updates

Once data records are complete and the quality review conducted, the data are published to different repositories external to the NOAA Trustee group. In particular, the data team focuses on posting information for use by the public. The bulk of the data sharing has been focused on sample results; however, we anticipate also needing to release observation and other data collected in the coming months. Specific tasks may include, as relevant:

- Coordinate the seven-day view period to apprise RP and Trustee leads when new data are pending publication to a public repository;
- Post associated data validation reports to assist RP and Trustee leads in the seven-day view activities;
- Conduct review of data deemed ready for posting to ensure all information has been reviewed and is ready to share; and
- Coordinate with end-user system contacts to ensure new data are represented correctly in the end-user systems.

These data management tasks are necessary to comprehensively maintain and ensure proper document and data preservation and develop consistent data suitable for application in the damage assessment.

Through the tracking and integration process, the DMT works to consolidate the information in the case into organized and comprehensive repositories. The tracking of analysis product data usage helps ensure that all TWGs are using consistent, up-to-date data products. The effort to maintain the infrastructure for those repositories and conduct the QC for the records is represented in separate data management-specific procedures.

Level of Effort

Our request for the subtidal oyster injury (abundance and biomass) activity is \$3.78M for contracts and \$70,800 for agency funds. These costs include 0.3 agency FTEs and 10.1 contract equivalents. Key personnel include the study PI, agency and IEc scientists, WEST statisticians, and field and lab staff. Costs are driven by the field work. Please refer Attachment A-6 for a detailed breakdown of costs.

Field Timetable

During the third quarter of 2015, the field work for subtidal abundance and biomass work will be completed. Also during this quarter, the enumeration of abundance and biomass data will occur such that preliminary results will be finished within several days of the completion of field activities. Data verification of abundance and biomass data is expected to take place in the fourth quarter of 2015.

Administrative Record

The NOAA team will continue to respond to requests for documents to complete the AR. This activity will include providing new documents and data related to oyster abundance/biomass fieldwork and analyses. The costs of the NOAA team in gathering and providing these records for AR purposes is captured here; the costs of capturing and processing these records for AR purposes is captured under the AR Tasks.

Activity 11: Continued Assessment of Subtidal Oyster Injury (Recruitment)

As mentioned above, understanding the recovery trajectory of an injured resource is critical to the Trustees' injury quantification efforts, because it allows us to understand the temporal scope of the injury to that resource. Preliminary data observed to date suggests an extended injury period with little evidence of recovery in the oyster population. Lack of observed recovery in subtidal oyster populations is consistent with Trustees' observations of rates of recruitment of oyster larvae to reefs since 2010. We recorded suppressed recruitment through the spring of 2013. Continued assessment in both spring and fall of 2014 will allow Trustees to further track these reproductive difficulties and more fully assess subtidal oyster recruitment injury and potential recovery over time. Under this activity, we will continue to monitor oyster larval recruitment rates (spat settlement) and adult oyster reproductive condition in subtidal nearshore habitats in Louisiana, Mississippi, Alabama, and Florida, and produce a dataset of 2015 assessment results that is ready to integrate into our models of injury to subtidal oyster resources. Additionally, recruitment results obtained in 2015 will provide critical information to restoration efforts on the spatial extent of recruitment failure. Data collected under this task will inform restoration decision-making and aid in the return of oyster recruitment in the northern Gulf to pre-Incident levels.

Recruitment (the successful attachment of live oyster larvae to hard substrate) is a key event in the oyster life cycle. Funded by the RP, the Trustees collected recruitment and reproductive data in the late summer through fall of 2010, most of 2011, fall of 2012, and spring of 2013. Under funding from the Third IPC, we collected recruitment data for spring 2014, and will be collecting recruitment data again in fall of 2014. This funding covered preliminary analysis of the recruitment data collected in 2014. This IPC also paid for initial data QA/QC and data management-associated costs through the end of 2014. The Third IPC funded preliminary analysis of the 2014 recruitment metrics, including comparison to previous recruitment sampling results.

In the Third IPC, the oyster TWG stated that preliminary analysis of recruitment data through 2012 showed widespread recruitment failure in areas affected by the Deepwater Horizon oil spill. Preliminary analysis of recruitment data collected in 2013 suggests that this recruitment failure persisted into 2013, and abundance data analyzed to date shows a continued lack of recovery in oyster populations through 2013. Reproductive condition data also suggest impaired reproduction in many locations and that adult oyster densities may be too low to lead to fertilization in many areas through 2013. Considering these observations, the Trustees expect diminished oyster populations for several years to come.

NOAA proposes continued assessment of recruitment and reproductive health during both the spring and fall spawning seasons in 2015 to document continued injury and, potentially, to document partial recovery. Assessing both the spring and fall spawning will allow NOAA to better assess continued injury to oyster reproduction, by providing additional data points for a time series of reproductive data for both of these important spawning periods. This study will provide information about the trajectory of oyster recruitment recovery and/or continued injury. After sampling is complete, NOAA and co-Trustees will conduct data verification activities to ensure the quality of our field and laboratory data and will produce a final dataset ready to be integrated into the Trustees' analyses of injury estimation and quantification (§990.51 and §990.52, respectively).

We are proposing to sample 135 subtidal sites most recently sampled in 2014 for recruitment; many of which were previously sampled in 2011, 2012, and 2013. Assessment at the full suite of sites allows for sufficient statistical power to detect significant differences in settlement rates and gonadal somatic and condition indices. The very low spat recruitment over the past several years further justify sampling at the full complement of sites used in past years.

Specific activities include:

- Recruitment assessment will include collection of settlement plates deployed for three-week intervals and collection of adult oysters for gonadal index measurement via tongs. In the spring and fall of 2015, field teams will deploy settlement plates at 135 sites across the northern Gulf. Two sets of three settlement plates will be deployed at each station during each round, with one set serving as a duplicate in case of settlement plate loss. During the spring season, up to four rounds of recruitment sampling will be performed at three-week intervals (up to 1,080 samples total). The fall effort will involve three rounds of recruitment sampling (up to 810 samples total). Trustees will analyze one of these sets of plates at each station following retrieval to enumerate live and dead spat that settle at these stations during the deployment period. Planning for up to four rounds of sampling in the spring will help ensure that the spring peak settlement will be captured. The project PI, Dr. Sean Powers, will oversee the measurement of recruitment rates

using the settlement plate samples. Settled live and dead oyster larvae (spat) will be enumerated for the three plates in each sample. Data will be converted into a measure of settlement per meter squared per day, using the enumeration data and the length of deployment.

- Gonadal index will be measured from up to 292 samples of adult oysters in the spring and up to 219 in the fall season to help understand the reproductive status of oysters and to identify when spawning is approaching, when it has occurred, or if it does not appear to occur within the sampling period. The project PI also will oversee the evaluation of the reproductive condition of the adult oysters collected using the gonadal index measurement. The gonadal index is measured as the width of the gonad divided by adductor muscle length. A condition index can also be measured for each oyster and is calculated as the weight of the oyster meat divided by shell weight.
- The field work will be preceded by a two-day in-person training for field samplers detailing assessment plan standard operating procedures and NRDA sample collection guidelines. This training will be led by NOAA contractors and attended by both federal and state representatives. This task requires funds for field sampling support, technical support from Dauphin Island Sea Lab, contractor-provided project management support, oyster specialists, statisticians, data management support, sample preparations and shipping support, observational and laboratory-generated data QA/QC, and vessels.

NOAA and its contractors oversee every aspect of these field sampling efforts. NOAA coordinates with co-Trustees to ensure the presence of both federal and state representatives in the field.

Also with requested funds in this activity and using data management systems like DIVER, our scientists also will begin arranging the full set of final analytical and observational results, final spatial data layers, final metadata, and other final data types to support the public review version of the DARP. An all-inclusive presentation of technical material is vital to support review of the draft DARP by the public. The full presentation of injury assessment results will document all injuries and detrimental effects observed across oyster abundance investigations since the Incident began. For example, multiple analysis components or interpretive analysis activities will be accounted for by our team (Oysters work plans listed in Attachment A-3 and in the bullets below):

- ❖ All results for oyster spat settlement (settlement plates) and oyster reproductive condition (gonadal indices)
- ❖ Analysis results and forensic evaluation of nearshore sediment samples
- ❖ Use of relevant toxicity test results to understand effect of oil exposure to oysters
- ❖ Incorporation of model results to estimate oyster recruitment injuries, including relevant water quality models
- ❖ In addition to oyster habitat characterization, use of nearshore benthic habitat and shoreline oiling characterizations across large areas of the Gulf of Mexico
- ❖ Final metadata for sampling efforts
- ❖ All spatial data and modeling information pertinent to oyster recruitment evaluations
- ❖ All PI-led technical reports and associated analyses

The result will be a well-organized and comprehensive set of final technical material that is made available to support the public's review of the draft DARP. Because the volume of scientific information

for NRDA and oyster recruitment is so large and diverse, this all-inclusive data presentation requires substantial coordination among the co-Trustees and Trustee data managers.

Data Management and QA/QC

As part of the recruitment field collection effort, NOAA and its contractors will oversee data management and data QA/QC work to ensure the validity of field-collected information including coordinating with co-Trustees on data verification efforts. The end result of this process will be a fully verified dataset of 2015 recruitment data. This subtask includes the following activities:

- Developing data documentation protocols (e.g., Sample ID naming convention, file naming convention, photo documentation);
- Training data managers and other cruise staff on use of various field collection forms and documents;
- Facilitating uploading of field data and associated files (e.g., chains of custody) to noaanrda.org data repository;
- Entering and transcribing data from field forms;
- Conducting initial QC of field sampling data;
- Processing of field sampling and/or observation data into NOAA data systems;
- Managing lab analysis priorities through regular coordination with analytical laboratories;
- Responding to various DMT questions during field sampling, data upload, and data sharing activities; and
- Completing QA/QC (validation) of both observational and laboratory data to result in a fully validated 2015 recruitment dataset.

As raw field data are validated and finalized, data support activities will also extend to the sharing of these results with the public. Data support activities will include the packaging, organization, and release of each data product along with associated metadata. Associated data storage and transfer costs as well as response to public inquiries are incorporated. Furthermore, the files associated with interim and final products generated through the processing and analysis of field and other collected data will be managed and shared in the NOAA data repositories to promote Trustee-wide data access.

Connection to NRDA Process

This activity will quantify injury and integrate exposure pathway and injury information for subtidal oysters to produce estimates of changes in recruitment following the oil spill. The assessment component continues the work of previous NRDA oyster recruitment and reproductive condition sampling efforts and will improve the Trustees' ability to understand and characterize the temporal extent of injury and the recovery trajectory expected for oyster reproductive injury. The degree and spatial extent of diminished oyster larvae settlement over time, including recovery trajectories, have implications for recovery of spat, seed, and adult oyster populations and may be used in combination with data from other oyster NRDA studies to inform a determination of restoration needed to compensate for injuries.

Data/Deliverables Produced

The products of this work plan include verified datasets of subtidal oyster recruitment and gonadal somatic and condition indices for incorporation in our oyster injury estimation and quantification. These datasets will cover both the spring and fall oyster spawning seasons. Recruitment data will include the calculated settlement per meter squared per day (based on settlement plate enumeration data and the length of deployment of settlement plates).

This procedure will require support from the DMT, who coordinates with the oyster TWG to understand the flow of information and provide support in integrating the data into the case tools.

As data related to this procedure are integrated into the system repositories, the DMT conducts quality reviews to promote consistent data suitable for application in the injury assessment and other restoration documents. These quality reviews range from basic standardization efforts (e.g., making spelling changes to misspelled species names) to complex lab analysis validation by a third-party lab validation specialist.

Typical reviews for new field collections and newly produced/shared results include:

- Confirming transcribed latitude and longitude coordinates based on GPS data collected
- Coordinating with TWG leads to review suggested coordinate changes and, when approved, make the necessary system updates
- Tracking the link between sample and observation data to ensure that any standardization changes are made consistently across both datasets
- Standardizing depth information, such as units
- Standardizing analyte names and reported units
- Standardizing species name and associated taxonomic hierarchy information
- Performing third-party validation for analytical chemistry samples
- Conducting final review of integrated field and lab result data for record completeness and accuracy prior to posting to Query Manager
- Reviewing processed instrument data for completeness and accuracy
- Reviewing analysis products to promote proper use of all applicable data and identifying any necessary updates

Once data records are complete and the quality review conducted, the data are published to different repositories external to the NOAA Trustee group. In particular, the data team focuses on posting information for use by the public. The bulk of the data sharing has been focused on sample results; however, we anticipate also needing to release observation and other data collected in the coming months. Specific tasks may include, as relevant:

- Coordinate the seven-day view period to apprise RP and Trustee leads when new data are pending publication to a public repository
- Post associated data validation reports to assist RP and Trustee leads in the seven-day view activities
- Conduct review of data deemed ready for posting to ensure all information has been reviewed and is ready to share
- Coordinate with end-user system contacts to ensure new data are represented correctly in the end-user systems

These data management tasks are necessary to comprehensively maintain and ensure proper document and data preservation and develop consistent data suitable for application in the damage assessment. Through the tracking and integration process, the DMT works to consolidate the information in the case into organized and comprehensive repositories. The tracking of analysis product data usage helps ensure that all TWGs are using consistent, up-to-date data products. The effort to maintain the infrastructure for those repositories and conduct the QC for the records is represented in separate data management-specific procedures.

Level of Effort

Our request for the subtidal oyster injury (recruitment) activity is \$7.1M for contracts and \$129,200 for agency funds. These costs include 0.6 agency FTEs and 22.3 contract equivalents, excluding IEc and agency data management activities, which are tabulated separately. Key personnel include the study PI, agency and IEc scientists, WEST statisticians, and field and lab staff. Please refer Attachment A-6 for a detailed breakdown of costs.

Field Timetable

The primary focus of the second quarter of 2015 will be the field collection of all samples. Also during this time, lab enumeration and measurement of field collected samples will commence the Dauphin Island Sea Lab. This task will continue through the end of the year. The third quarter of 2015 will mark the start of the fall recruitment fieldwork and the beginning of the validation of recruitment and gonadal index metrics collected during the spring of 2015. Data analysis and refinement of injury estimates will continue in the fourth quarter of 2015.

Administrative Record

The NOAA team will continue to respond to requests for documents to complete the AR. This activity will include providing new documents and data related to oyster recruitment fieldwork and analyses. The costs of the NOAA team in gathering and providing these records for AR purposes is captured here; the costs of capturing and processing these records for AR purposes is captured under the AR Tasks.

Activity 12: Continued Assessment and Analysis of Nearshore Oyster Injury

Nearshore oysters are a subpopulation of oysters that are often protected from harvest because of their proximity to land. They are thought to contribute substantially to the overall larval pool of oysters in the Gulf, and thus injury to these resources may have ripple effects on the rest of the oyster population, including recruitment in subtidal reefs.

Nearshore field sampling in 2012 and 2013 demonstrated that oyster habitat was present in much of the nearshore environment; that oyster abundance and biomass was low across much of the northern Gulf; and that oysters may have been exposed to MC252 oil in much of the affected shoreline. Following a limited nearshore study in 2012, the oyster TWG expanded the scope of nearshore sampling in 2013 to include a range of nearshore oiling conditions across Louisiana, Mississippi, Alabama, and Florida. Field teams observed weathered oil at six nearshore sites in 2013. Oil samples collected at four of these sites

fingerprinted to MC252 oil. Under this activity NOAA will continue to assess, evaluate, and quantitatively characterize Incident-related injuries to oysters in the nearshore zone along the shoreline of the Gulf.

NOAA first studied these oysters in a limited way in early 2012, following notification by the marsh edge sandy shore submerged oil sampling teams that oysters were present at more than thirty of their sites. These observations led to development of the 2012 oyster nearshore sampling effort. Field teams found oysters at 93% of the sites visited under this work plan. NOAA expanded this sampling in 2013 by visiting 266 sites across the Gulf, including sites previously sampled by the Oyster TWG in 2012, an expanded random sample of sites from previous DWH NRDA shoreline plans, and randomly selected shoreline segments in areas less intensively sampled in previous plans. NOAA designed the sample frames to select locations across a range of expected shoreline oiling conditions. The RP funded both of these field efforts. Although NOAA requested funding under the Third IPC to perform additional nearshore field sampling in 2014, this request was later withdrawn due to timing of funding decisions in 2014.

Our preliminary findings show relatively low abundance and low percent cover of nearshore oysters near oiled shorelines as compared with unoiled shorelines. These results, together with the dramatic, widespread, and persistent recruitment failure observed in the subtidal reefs further offshore, underline the importance of additional nearshore oyster injury assessment study. A better understanding of the degree and extent of the nearshore oyster injury is therefore critical for understanding when oyster recruitment may return to pre-Incident levels in subtidal oyster reefs and thus may be used to quantify injury to subtidal oyster resources. An additional year of sampling data will allow Trustees to determine if the oil related effects on abundance and percent cover that were observed in 2013 persist in 2015. It is also needed to understand any extended injuries to oysters in the nearshore and how they may relate to injury observed in subtidal oyster resources in the Gulf of Mexico since the Incident (§990.51 and §990.52). Additionally, restoration efforts in nearshore areas would benefit from an additional year of abundance data to help determine the appropriate spatial extent of restoration activities (§990.53 and §990.54).

Preliminary data from NOAA's 2012 oyster intertidal plan and 2013 nearshore plan support the conceptual injury model above. In order to further monitor the abundance of nearshore oyster populations, we propose to repeat the 2013 nearshore plan in 2015. Continuing sampling will provide a statistically robust dataset across multiple years which will help inform assessments of nearshore oyster injury and potential recovery. The result of this investigation will be detailed data on percent cover of oyster habitat, abundance estimates that can be compared across site exposure characteristics, and data on distribution of shell height and condition index by sample site. We have demonstrated potential injury to oysters due to oil exposure in the nearshore, and an additional year of nearshore data will provide key information on the temporal extent of oyster injury in this environment.

After sampling is complete, NOAA and co-Trustees will conduct data verification activities to ensure the quality of our field and laboratory data and will produce a final dataset ready to be integrated into the Trustees' analyses of injury estimation and quantification.

Specific activities include:

- The 2015 nearshore field effort will consist of sampling the same sites sampled under the 2013 nearshore plan, with replacement sites assigned for any 2013 sites that were inaccessible. Sites were chosen from sites for which exposure has been characterized either through previous sediment sampling or via shoreline oiling characterizations conducted by other TWGs. The field component of nearshore oyster work is expected to begin in February 2015 and be finished by early April 2015.
- Each site will be mapped via transects in the same manner as in the 2012 and 2013 nearshore plans. NOAA, in conjunction with the Trustees and the RP, developed this transect-based reconnaissance method for mapping nearshore oyster reefs that can be conducted from the shoreline. This method is efficient in finding potential oyster resource, is cost-effective, and allows the team to map percent cover and identify quadrat sampling locations all within the same site visit, minimizing the need for multiple trips and for additional labor to pre-identify sample sites. The resulting detailed data on the percent cover of oyster resources in nearshore habitats are critical for the Trustees to more broadly estimate the percent cover of oyster resources in areas close to shore. In 2015, mapping will use transects offset from those mapped in previous nearshore oyster plans, to avoid overlap with quadrat sample locations from previous plans.
- Field work will begin with a two-day in-person training for field samplers detailing assessment plan standard operating procedures and NRDA sample collection guidelines, as well as safety procedures. This training will be led by NOAA contractors and attended by both federal and state representatives. This task requires funds for field sampling support, technical support from Dauphin Island Sea Lab, contractor-provided project management support, oyster specialists, statisticians, data management support, sample preparations and shipping support, observational and laboratory-generated data QA/QC, and vessels.

NOAA and its contractors oversee every aspect of these field sampling efforts. NOAA coordinates with co-Trustees to ensure the presence of both federal and state representatives in the field. States may also provide vessels and equipment necessary to complete fieldwork.

Also with requested funds in this activity and using data management systems like DIVER, our scientists also will begin arranging the full set of final analytical and observational results, final spatial data layers, final metadata, and other final data types to support the public review version of the DARP. An all-inclusive presentation of technical material is vital to support review of the draft DARP by the public. The full presentation of injury assessment results will document all injuries and detrimental effects observed across oyster abundance investigations since the Incident began. For example, multiple analysis components or interpretive analysis activities will be accounted for by our team (Oysters work plans in Attachment A-3 and in the bullets below):

- ❖ All results for field reconnaissance activities to locate and estimate percent cover of oysters along the shoreline, including data on abundance, biomass, shell height, and condition index by sampling site.
- ❖ Analysis results and forensic evaluation of nearshore sediment samples
- ❖ Use of relevant toxicity test results to understand effect of oil exposure to oysters
- ❖ Incorporation of model results to estimate oyster injuries, including relevant water quality models
- ❖ In addition to oyster habitat characterization along shorelines, use of nearshore benthic habitat and shoreline oiling characterizations across large areas of the Gulf of Mexico

- ❖ Prepare final metadata for sampling efforts
- ❖ All spatial data and modeling information pertinent to oyster abundance, biomass, and mortality evaluations
- ❖ All PI-led technical reports and associated analyses

The result will be a well-organized and comprehensive set of final technical material that is made available to support the public's review of the draft DARP. Because the volume of scientific information for NRDA and nearshore oysters is so large and diverse, this all-inclusive data presentation requires substantial coordination among the co-Trustees and Trustee data managers.

Data Management and QA/QC

As part of the nearshore field collection effort, NOAA and its contractors will oversee data management and data QA/QC work to ensure the validity of field-collected information, including coordinating with co-Trustees on data verification efforts. The end result of this process will be a fully verified dataset of 2015 nearshore data. This subtask includes the following activities:

- Developing data documentation protocols (e.g., Sample ID naming convention, file naming convention, photo documentation)
- Training data managers and other cruise staff on use of various field collection forms and documents
- Facilitating uploading of field data and associated files (e.g., chains of custody) to noaanrda.org data repository
- Entering and transcribing data from field forms
- Conducting initial QC of field sampling data
- Processing of field sampling and/or observation data into NOAA data systems
- Managing lab analysis priorities through regular coordination with analytical laboratories
- Responding to various DMT questions during field sampling, data upload, and data sharing activities
- Completing QA/QC (validation) of both observational and laboratory data to result in a fully validated 2015 nearshore dataset

As raw field data are validated and finalized, data support activities will also extend to the sharing of these results with the public. Data support activities will include the packaging, organization, and release of each data product along with associated metadata. Associated data storage and transfer costs as well as response to public inquiries are incorporated. Furthermore, the files associated with interim and final products generated through the processing and analysis of field and other collected data will be managed and shared in the NOAA data repositories to promote Trustee-wide data access.

Connection to NRDA Process

This activity continues work performed under the 2012 oyster intertidal plan and the 2013 oyster nearshore plan and provides additional data on oyster habitat and abundance in nearshore areas. This activity will enable NOAA to quantify injury and integrate exposure pathway and injury information for nearshore oysters and will also enable NOAA to estimate a percent cover estimate for nearshore oysters critical to the final injury assessment and quantification of the nearshore area impacted as a result of the

Incident. The results of the nearshore effort will help inform injury assessment in the subtidal zone related to the suspected link to the diminished larval supply in the Gulf, under the activity of developing the integrated oyster injury quantification discussed below (Completion of Oyster Injury Quantification). Results will also support scaling of oyster injuries to restoration.

Data/Deliverables Produced

The products of this work plan include verified datasets of nearshore oyster abundance and biomass percent cover, shell height, and condition index for incorporation in our oyster injury estimation and quantification. As in the 2012 and 2013 studies, abundance and biomass by size class will be assessed using quadrat samples. A representative subsample of oysters from each quadrat will also be examined for shell height and condition index.

This procedure will require support from the DMT, who coordinates with the oyster TWG to understand the flow of information and provide support in integrating the data into the case tools.

As data related to this procedure are integrated into the system repositories, the DMT conducts quality reviews to promote consistent data suitable for application in the injury assessment and other technical documents. These quality reviews range from basic standardization efforts (e.g., making spelling changes to misspelled species names) to complex lab analysis validation by a third-party lab validation specialist.

Typical reviews for new field collections and newly produced/shared results include:

- Confirming transcribed latitude and longitude coordinates based on GPS data collected
- Coordinating with TWG leads to review suggested coordinate changes and, when approved, make the necessary system updates
- Tracking the link between sample and observation data to ensure that any standardization changes are made consistently across both datasets
- Standardizing depth information, such as units
- Standardizing analyte names and reported units
- Standardizing species name and associated taxonomic hierarchy information
- Performing third-party validation for analytical chemistry samples
- Conducting final review of integrated field and lab result data for record completeness and accuracy prior to posting to Query Manager
- Reviewing processed instrument data for completeness and accuracy
- Reviewing analysis products to promote proper use of all applicable data and identifying any necessary updates

Once data records are complete and the quality review conducted, the data are published to different repositories external to the NOAA Trustee group. In particular, the data team focuses on posting information for use by the public. The bulk of the data sharing has been focused on sample results; however, we anticipate also needing to release observation and other data collected in the coming months. Specific tasks may include, as relevant:

- Coordinate the seven-day view period to apprise RP and Trustee leads when new data are pending publication to a public repository;

- Post associated data validation reports to assist RP and Trustee leads in the seven-day view activities;
- Conduct review of data deemed ready for posting to ensure all information has been reviewed and is ready to share; and
- Coordinate with end-user system contacts to ensure new data are represented correctly in the end-user systems.

These data management tasks are necessary to comprehensively maintain and ensure proper document and data preservation and develop consistent data suitable for application in the damage assessment. Through the tracking and integration process, the DMT works to consolidate the information in the case into organized and comprehensive repositories. The tracking of analysis product data usage helps ensure that all TWGs are using consistent, up-to-date data products. The effort to maintain the infrastructure for those repositories and conduct the QC for the records is represented in separate data management-specific procedures.

Level of Effort

Our request for the nearshore oyster injury activity is \$5.73M for contracts and \$99,700 for agency funds. These costs include 0.5 agency FTEs and 17.7 contract equivalents. Key personnel include the study PI, agency and IEC scientists, WEST statisticians, and field and lab staff. Please refer Attachment A-6 for a detailed breakdown of costs.

Field Timetable

The primary focus during the first quarter of 2015 will be the field component of the nearshore oyster work which is expected to finish by late spring 2015. The enumeration of abundance and biomass will occur concurrently with fieldwork and preliminary results will be finished within several days of the completion of field activities. Initial review and validation of field and laboratory data will begin in the second quarter and is expected to be complete by the end of summer 2015.

Administrative Record

The NOAA team will continue to respond to requests for documents to complete the AR. This activity will include providing new documents and data related to nearshore oyster fieldwork and analyses produced. The costs of the NOAA team in gathering and providing these records for AR purposes is captured here; the costs of capturing and processing these records for AR purposes is captured under the AR Tasks.

Activity 13: Completion of Oyster Injury Quantification

This task requires funds for contractor-provided project management, analysis, and drafting support for briefings and reports, plus support from oyster specialists and statisticians. Under this task, the NOAA team will undertake an array of activities to finalize draft injury estimates developed in 2014. Activities under this task in 2015 will continue to constitute a significant effort due to the extensive nature of both oyster fieldwork and analytical tasks for the DWH oyster NRDA. Since 2010, the NOAA oyster team has planned and implemented a near continuous field sampling program in order to document the persistent

multiyear injury to oysters in nearshore and subtidal zones in the north-central Gulf of Mexico. As a result, our injury assessment involves management and analysis of a large, multi-endpoint, multi-year dataset that we expect to continue to augment with 2014 and 2015 data. As data become available throughout 2015, we will need to continue our efforts to integrate the field-collected data into our injury assessment model and refine documentation of our analysis in the DARP and technical appendices, PEIS, and other relevant documents. Specific activities to be conducted under this task in 2015 include:

- prepare and refine analytical products and interpretive reports documenting the Trustees' injury analysis, including the DARP;
- complete analyses of new data collected in 2015 and integrate activity information to support scaling of oyster injury for restoration;
- conduct review and analysis of other datasets, including RP-generated, non-cooperative data;
- conduct oyster coordination activities;
- conduct data management and visualization activities; and
- conduct QA/QC of new NRDA data.

In addition, the NOAA team will continue to coordinate with other Trustees to review injury assessment results for the oysters by zone (subtidal and nearshore) and metric (abundance and reproduction) to develop a unified injury assessment of the impacts of the Incident on oysters in the Gulf. Detailed descriptions of each of these activities are presented below.

The Third IPC funded:

- Oyster literature review efforts
- Analysis and modeling of field-collected data
- Data verification from NRDA sampling plans conducted in 2014
- Integrating NRDA and non-NRDA oyster-related data from 2010 through 2013
- Hydrodynamic modeling of oyster larvae and of oil transport in nearshore and subtidal environments
- Refinement of oil exposure estimates in nearshore and subtidal environments
- Refinement of water quality models, with a focus on Davis Pond and Caernarvon freshwater diversion areas in Louisiana
- Nestier tray survival model development to understand water quality parameters that affect oyster survival
- Development of percent cover estimates in subtidal areas

Interpretive report preparation

Although preliminary injury quantification will be completed in 2014 for the DARP to be completed in 2015, the NOAA oyster team expects to revise injury estimates based on 2014 and 2015 field-collected data and pertinent comments from co-Trustees. We will continue to update injury assessment models as data becomes available from 2014 fieldwork and from the work described in Continued Assessment of Subtidal Oyster Injury – Abundance and Biomass, Continued Assessment of Subtidal Oyster Injury – Recruitment, and Continued Assessment of Nearshore Oyster. The oyster team will develop up to 10 technical appendices describing oyster analyses and findings which support the injury assessment. The DARP will be updated to reflect the results of analyses which incorporate 2014 and 2015 NRDA data as

well as supporting information from peer-reviewed literature, non-NRDA data, and other relevant sources. This task will continue to refine preliminary models for the prediction of water quality parameters in areas critical to the injury claim. This includes the areas of influence of the Davis Pond and Caernarvon freshwater diversion areas in Louisiana (which were fully opened as a response action to the Incident in 2010), where lowered salinities could increase the susceptibility of oysters to other stressors, such as MC252 oil. The persistent failure to recover which continued to be observed through 2013 is unlikely solely due to the influx of freshwater from the opened diversions in 2010. The failure to return to pre-Incident levels by 2013 shows injury to oyster resource beyond what would be expected from freshwater exposure alone. The oyster team will continue to assess salinity, toxicology, 2014 NRDA, and 2015 NRDA data in order to refine injury assessments presented in the DARP, including the development and revision of technical appendices presenting detailed analyses in support of the injury claim. This task requires funds for contractor-provided project management, analysis, and documentation drafting support, and support from oyster specialists and statisticians.

NOAA will be required to address comments across all aspects of the oyster injury assessment, including subtidal, nearshore, and reproductive injury. Addressing comments may require NOAA to re-evaluate previous analyses, and potentially revisit associated data and statistical analysis. We may need to evaluate alternative approaches to our assessment or consider datasets not currently incorporated. Co-Trustees have historically played a very active role in the oyster injury assessment. As a result, we are planning for a significant level of effort to coordinate with co-Trustees and address their comments.

Statistical analysis and integration of 2015 data into injury claim

While the three fieldwork activities detailed above will fund data collection and validation for 2015 data, the Trustees will analyze and incorporate 2015 data into ongoing injury estimation and quantification efforts. The oyster team will begin analyzing data collected in 2015 as soon as transcription-verified datasets become available. The oyster team will rerun analyses incorporating the 2015 datasets (nearshore and subtidal abundance, subtidal recruitment, nearshore and subtidal gonadal and condition indices) and refine injury estimates based on these analyses. This effort will link the results of data collected in 2015 to the conceptual model for the impacts of the Incident on oyster resources in the Gulf. Data to be integrated include:

- Nearshore: This task will calculate percent cover estimates across the 266 nearshore sites in 2015 and estimate oyster habitat in nearshore areas across the northern Gulf. Nearshore adult, juvenile, and spat abundance and biomass will be assessed, with a focus on understanding recovery trajectories in the nearshore and on the longer term effects of oiling on oyster abundances by size class. Shell height will be used to understand growth patterns and the loss of certain size categories due to the Incident. The reproductive health of nearshore oysters will be assessed through gonadal index and condition index analyses, which will be compared to sampling performed in 2012 and 2013.
- Subtidal abundance and biomass will be determined from quadrats taken across approximately 169 sites in the northern Gulf. Abundance and biomass will be compared to previous sampling years, with a focus on determining the recovery trajectory and continued injury.
- Subtidal abundance and biomass will be collected at 20 new sites as part of the 2015 sampling. These results will be compared to quadrat data collected at the 149 subtidal sites sampled since

2010. This analysis will provide Trustees with data on the representativeness of the subtidal abundance and biomass data.

- Subtidal recruitment has continued to be very low across most sites in the northern Gulf. Sampling in 2015 will allow the oyster team to better understand areas based on sampling at up to 135 sites to focus restoration efforts due to continued diminished recruitment and lack of recovery over both fall and spring spawning seasons.

Review and evaluation of other datasets

In addition to finalizing the Trustees' oyster injury claim based on Trustee data and analysis, the NOAA team expects that we will need to review, evaluate, and analyze additional sources of data relevant to the injury assessment in 2015. We plan to critically review and analyze all relevant data as part of the effort to finalize our injury assessment and support scaling for oyster injuries:

- **Non-cooperative RP data.** Throughout the NRDA, BP has undertaken some analyses on a non-cooperative basis. Recently, BP agreed to share up to 10 terabytes of data with the Trustees (some of it non-cooperative). We anticipate that a significant portion of these data will be relevant to the oyster injury assessment and will require careful scrutiny by the Trustees, beginning in 2015. For example, we are aware of salinity studies conducted by BP non-cooperatively in spring 2011 that may have relevance to our modeling of oyster injury in areas near the outfalls of the Morganza and Bonnet Carré spillways.
- **Co-Trustee Analyses.** As part of the co-Trustee review process for the draft DARP and technical appendices, NOAA expects it will need to review data and analyses performed by co-Trustees that have yet to be completed (e.g., Mississippi AQUATOX modeling in Mississippi Sound).
- **Toxicological Studies.** We propose to evaluate and critically review ongoing toxicological studies conducted in support of the NRDA process for their relevance to the oyster injury claim.
- **Third-party Analyses.** Studies relevant to, but conducted outside of, the DWH NRDA continue to be published in the peer-reviewed literature. We propose to review third-party non-NRDA studies and analyses published in 2015.

Oyster Injury Assessment Coordination

NOAA's oyster team will continue to provide Trustee-wide technical support, including scheduling and running oyster team and oyster Trustee calls as needed and managing subcontractors. This task will involve ensuring that reports and other products are developed according to guidelines and are finished by the appropriate deadlines. As discussed above in the Report Preparation section, we anticipate a lengthy review process for oyster sections in the DARP, including multiple rounds of review, both by co-Trustees and the public. In particular, NOAA expects a substantial volume of co-Trustee comments, based on historical levels of co-Trustee input into the oyster injury assessment.

Data management and visualization

Data management for field-collected data will continue into 2015 for the abundance and recruitment datasets. Tasks will include:

- Maintenance of the original field data as well as associated analytical results in secure data repositories (e.g., NOAA-NRDA.ORG, ERMA), including associated server, data transfer and storage space costs

- Maintenance of data retrieval/sharing websites to ensure Trustee-wide access to data while maintaining associated metadata (e.g., data history / change logs)
- Delivery of lab data to Trustee and RP representatives per data sharing agreement
- Storage and tracking of external hard drives collected during field sampling to manage large files

To facilitate the validation of visual observation data, data management activities include participating in TWG-wide coordination activities (e.g., promote standard validation approaches), as well as the incorporation of changes (e.g., transcription verification and data validation changes) into the NOAA data repositories to promote Trustee-wide analysis of a consistent data product.

In addition to the effort associated with physically analyzing samples collected previously, associated management of the process includes coordinating analytical activities; data tracking activities to provide status reports on analytical progress and data availability; third-party validation of lab results to ensure data is in proper format and meets quality standards; secondary QA/QC of field data prior to merging with lab results; incorporation into repositories as final, validated products; forensic chemistry to identify source of contamination; and spatial processing and loading into ERMA.

QA/QC of 2014 NRDA data

Field collection efforts funded under the Third IPC will continue through fall of 2014. Following laboratory enumeration, the oyster team will begin the process of QA/QC'ing these data, including performing transcription verification, conducting initial QC of field sampling data, and processing field sampling and/or observation data into NOAA data systems. As 2014 raw field data are validated and finalized, data support activities will also extend to the sharing of these results with the public. Data support activities will include the packaging, organization, and release of each data product along with associated metadata. Associated data storage and transfer costs as well as response to public inquiries are incorporated. Furthermore, the files associated with interim and final products generated through the processing and analysis of field and other collected data will be managed and shared in the NOAA data repositories to promote Trustee-wide data access.

Connection to NRDA Process

This work will use data collected under previous NRDA oyster sampling plans and refine draft analyses on oyster recruitment, adult and juvenile abundance and biomass, and oyster resource percent cover estimation efforts.

Data/Deliverables Produced

The deliverables from this task include:

- Final comprehensive interpretive report on the spatial and temporal extent of injury to both nearshore and subtidal oysters across multiple life-stages through 2015. This information will be used to inform oyster reef restoration planning.
- Verified datasets from all work plans.
- Collection and organization of all field-collected and non-analytical lab data into a usable electronic form or databases that can be used in analysis for data collected in 2014 and 2015.

- Statistical and geographic analysis of abundance, biomass, recruitment, reproductive, and oyster resource coverage data, to inform the development of statistical modeling.
- Finalized univariate and multivariate statistical modeling to assess the impacts of oil and freshwater exposure on the response metrics. Models will be updated with data collected in 2014 and 2015 as it becomes available.
- Up to ten data summaries or technical reports that may be part of the DARP. Review and analysis of non-cooperatively collected data from the RP, as well as review and analysis of third party studies and data from late 2014 and 2015.
- Two Oyster TWG Trustee in-person meetings and four meetings with NOAA personnel and contractors, which will focus on refining interpretive documentation, finalizing relevant analyses, and incorporation of 2014 and 2015 sample data into the injury assessment.

Once oyster data records are complete and the quality review conducted, the data are published by the DMT to different repositories external to the NOAA Trustee group. In particular, the data team focuses on posting information for use by the public. We will coordinate with end-user system contacts to ensure new data are represented correctly in the end-user systems

These data management tasks are necessary to comprehensively maintain and ensure proper document and data preservation and develop consistent data suitable for application in the damage assessment. Through the tracking and integration process, the DMT works to consolidate the information in the case into organized and comprehensive repositories. The tracking of analysis product data usage helps ensure that all TWGs are using consistent, up-to-date data products. The effort to maintain the infrastructure for those repositories and conduct the QC for the records is represented in separate data management-specific procedures.

Level of Effort

The total estimated costs for activities needed to complete the oyster claim are \$286.2K in contract and \$345,900 in agency funds. These costs include 1.3 agency FTEs and 0.7 contract equivalents. Key personnel include the study PI, agency and IEC scientists, and WEST statisticians. Please refer Attachment A-6 for a detailed breakdown of costs.

Administrative Record

The NOAA team will continue to respond to requests for documents to complete the AR. This activity will include providing new documents and data related to integrated oyster interpretive analyses. The costs of the NOAA team in gathering and providing these records for AR purposes is captured here; the costs of capturing and processing these records for AR purposes is captured under the AR Tasks.

OTHER INVESTIGATIONS

G. Lost Human Use

Activity 14: Lost Human Use

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 CFR § 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 CFR § 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 CFR § 990.27(c)). Finally, assessment procedures must contribute to injury determination (i.e., by establishing the spatial and temporal magnitude of exposure to oil, the pathway(s) of exposure, and/or the presence of injury, as described in 15 CFR § 990.51) and/or injury quantification (i.e., quantifying the degree, spatial and temporal extent of injury to natural resources and the associated reduction in services caused by the injury, as described in 15 CFR § 990.52).

Through co-Trustee and internal review processes, NOAA has determined that the assessment procedures identified in this document meet these requirements, and are integrated with (and not duplicative of) other NRDA data collection and analysis activities. All of the activities make use of field, behavioral laboratory, model and/or literature-based methods. Many involve the collection of field data needed to confirm the presence of natural resource injury and/or inform estimates of the magnitude of injury and associated reductions in services. The scale and cost of each activity were carefully considered and represent a balance between the need for cost-effective assessment efforts and the unprecedented geographic scale and complexity of this oil spill, in light of input provided by NOAA's co-Trustees.

The activities described herein encompass a variety of efforts needed to complete the Trustees' assessment of the diminished use and lost value from the DWH oil spill. These efforts are a set of new tasks necessary to support previous work, which began in May 2010 and includes surveys of recreational activities, investigations of possible approaches for estimating lost total value and initiation of those approaches, and background studies on economic activity related to marine recreation and total value.

Standards of Performance

Because all work performed under the work plan must meet high standards of professional performance and technical rigor, highly qualified and experienced experts will design and implement the work. Work

products will be developed to meet or exceed generally accepted technical standards, methods, and procedures used in the field of natural resource valuation. The activities and budget outlined below are subject to modification based on information obtained during the course of the assessment and the evolution of the spill incident and its impacts on natural resources.

General Approach to the Study

As described in 15 CFR § 990.53, the Trustees have considered resource-to-resource and service-to-service scaling approaches. Because of the magnitude of the DWH oil spill and the potential for national impacts, the Trustees determined that addressing the public's value losses through replacement restoration projects without an explicit measurement of value was not appropriate. The Trustees further determined that valuation of lost services is practicable, but valuation of the replacement natural resources and/or services cannot be performed within a reasonable time frame or at a reasonable cost. Therefore the Trustees have elected to estimate the dollar value of the lost services. The Trustees have further determined that the estimation of lost value needs to involve four general information-collection efforts: determination of direct use/recreational use under spill-impacted conditions; determination of baseline recreational use; assessment of the value of lost and diminished recreation trips; and assessment of the lost total value (both direct/recreational and passive use).

At this time, direct/recreational use sampling concluded at the end June 2013. Through review of the collected onsite data, experts are working to determine the impact on recreational use resulting from the spill by comparing estimated spill impact time periods with estimated baseline time periods. A separate population survey has been used to assess the value of recreational trips lost, as well as the diminution in the value of trips that are taken in other than baseline conditions. This work described in this Claim is a set of new tasks required to complete the recreation assessment that is already underway and help support the development of the Trustees' final DARP. The total value assessment activities are also unique tasks required to complete the ongoing total value assessment.

Previous funded assessment work involved the following activities, which are described in more detail in our previously published Assessment Plans. A copy was published on the NOAA Gulf Spill Restoration webpage under NRDA Workplans and Data⁴ and accessible via direct static link on June 11, 2012⁵. An updated version of the Assessment Plan was published in the same location and accessible via direct static link on August 16, 2012⁶. Some of these assessment activities are still ongoing, and include:

- Complete valuation studies, including an approach to valuation that would be applicable to each major category of recreation, i.e. boating and boat-based fishing, shoreline fishing, and shoreline use other than fishing
- Continue to investigate approaches to the quantification of lost trips and valuation of specialized recreational activities and estimate the quantities of lost trips.

⁴ <http://www.gulfspillrestoration.noaa.gov/oil-spill/gulf-spill-data/>

⁵ http://www.gulfspillrestoration.noaa.gov/wp-content/uploads/2012/06/Assess-Plan-for-Past-Costs_final.pdf

⁶ http://www.gulfspillrestoration.noaa.gov/wp-content/uploads/2012/08/Assess-Plan-Demand-2-for-Upfront-Funding_Human-Use_DH_Phase2_final-072512-with-budget.pdf

- Continue to identify and acquire studies and datasets that provide supporting information on the levels of recreational use
- Investigate baseline use and information that can be used to characterize a return to baseline conditions
- Perform a study of multiple-day recreation trips and investigate the best approaches to the valuation of these trips
- Investigate trends in economic activity related to recreation and the relationship of these trends to the pattern of activities observed in the onsite sampling
- Undertake total value literature reviews and supporting studies
- Complete total value survey administration and final data analyses
- Retain experts, including peer reviewers, as necessary
- Continue to follow chain of custody and QA/QC data and information handling procedures

This Claim involves the following new, additional and distinct activities, which are described in more detail below:

- Support development of the DARP
- Finalization of Technical Memos
- Outreach and coordination with co-Trustees and the public
- Development of the AR
- Literature review and analysis of new public and RP-generated data
- Preparation of Expert Reports

Total valuation was used by the Trustees to estimate the value of damages to natural resources in the Exxon Valdez and Montrose natural resource damage cases. Because of the substantial costs involved in implementing total value procedures for litigation, they are typically only employed for the largest of natural resource damage cases. The total value procedure will make use of standard stated preference valuation methods (which may include conjoint analysis, contingent valuation and attribute-based stated choice techniques).

Stated preference methods are well-established approaches for estimating the total value of natural resource damages in monetary terms. Since 1963, there have been over 7,500 papers and studies published using stated preference methods. Stated preference methods are explicitly permitted for use in damage assessments carried out under DOI's CERCLA regulations and NOAA's OPA regulations. Prior to promulgating its NRDA regulations for OPA, NOAA commissioned a panel of five experts in economics and survey research, including two Nobel Laureates, to determine whether the contingent valuation technique is capable of providing reliable information about lost existence or passive-use values (i.e. total value) in the NRDA context. The NOAA panel concluded in a 1994 report that contingent valuation, if properly conducted produces estimates reliable enough to be the starting point of a judicial process of damage assessment, including lost passive-use values.

Team Development, Management, and Support

The Trustees have assembled a team of highly skilled and experienced professionals/experts in the fields of environmental and natural resource economics, survey research, econometrics and other social

sciences, and NRDA. The team may be augmented, as necessary, to address specific needs. The work of the experts will be rigorously peer reviewed.

IEc is providing technical, managerial, and administrative support for conducting the NRDA and producing deliverables. To allow for efficient management of the team, team members are assigned to specific subject areas for which they provide direct support. Subject-area teams will be adjusted, as necessary, to meet the overall schedule and goals of the assessment. IEC will ensure team organization and communications, conduct team meetings and communicate with NOAA and team members. The focus of this effort is to ensure the efficient use of Experts and to ensure regular communication within the expert consulting team and with the co-Trustees.

Categories of Lost Human Use Being Assessed

Direct Use/Recreation

The recreational lost use assessment is evaluating impacts to boating and boat-based fishing, shoreline fishing, and general shoreline use. Additional studies have taken place which address the valuation of lost use, the definition of baseline, analysis of secondary and existing data, and the review of impacts to other recreational activities.

The tasks outlined below are new/additional tasks undertaken and are supplemental to the previous assessment plans.

Task 14: Support development of Damage Assessment and Restoration Plan

The Trustees have developed a plan and timeline for development of the DARP. This plan will identify the components of the natural resource injury and necessary restoration actions that the Trustees will implement to compensate the public for damages resulting from the spill. One or more chapters of the DARP along with a set of technical appendices will be dedicated to human use injuries assessed as part of this and previous Assessment Plans. The technical appendices will be written to support our assertions in the DARP and will heavily draw from the set of Technical Memos described below. In addition to development of the DARP chapter and appendices, NOAA will work with co-Trustees in development of the DARP chapters as well as be available to respond to public comment. Additional modifications to the DARP or additional assessment activities may be required as a result of this public participation process. Although NOAA is working on developing all necessary supporting materials, there is not yet a consensus-based deadline for the finalization of the DARP at the Trustee Council level. Development of the DARP will require Expert input and review as well coordination across Trustee sub-committees. Additional Expert input may be required to respond to public comments or to modify the modeling approach as a result of public input.

Task 15: Finalization of Technical Memos

The primary work product of the earlier assessment effort is a set of approximately 45 Technical Memos which outline the data collection, modeling decisions, and outcomes of the earlier assessment tasks. In earlier assessment plans, these have been referred to as “recreational use assessment reports.” These Technical Memos are currently in draft-final stages of completion; however, NOAA anticipates additional activities in fiscal year (FY) 2015 which will require NOAA and expert input. Specifically, these Technical Memos will need to be peer reviewed, updated to reflect potential comments from co-Trustees,

and finalized so that all (or a subset) of them can be drawn from in the development of the technical appendices of the DARP, the final expert report, or both.

Task 16: Outreach and coordination with co-Trustees and the public

Ongoing outreach and coordination with co-Trustees will be continued to ensure that the assessment efforts undertaken to date fully account for recreational losses due to the spill, to help address questions or concerns about the methodology used throughout the assessment, and to prepare for comments from the public. A set of meetings are anticipated through the end of 2015 to allow co-Trustee technical representatives to interact directly with the team of Experts that developed the assessment. Additional meetings or outreach activities will be necessary during the DARP public comment period. These meetings and outreach activities require the participation of all, or a subset, of our Expert team to ensure that co-Trustees and the public have a full understanding of the set of decisions made, assessment techniques utilized, and the basis for the Trustee claim.

Task 17: Development/maintenance of the Administrative Record

The Trustees are organizing files, emails, memos, and datasets generated over the last four years into a comprehensive AR. Trustee technical staff and consultants will be sorting through these potentially relevant documents and attributing them based on attorney guidelines. The NOAA team will continue to respond to requests for documents to complete the AR. The costs of the NOAA team in gathering and providing these records for AR purposes is captured here.

Task 18: Literature review and analysis of new public and RP-generated data

Although primary Trustee-directed data collection and analysis has concluded, it is anticipated that additional economics literature will be generated that addresses potential losses due to the spill. The Trustees plan to track and review any new literature to make sure that the Trustees' approach is consistent with the most recent and relevant published science. Additionally, it is anticipated that new public and RP generated lost recreational use data will become available in the next year and a half. Likewise, the Trustees plan to review and analyze any new data to ensure that the Trustee claim is consistent with any and all available information relating to the spill.

Task 19: Preparation of Expert Report

The Trustees plan on having a subset of the Expert team author an expert report that summarizes the assessment tasks, modeling decisions, and outcomes in a document that will be ready to submit to the RP, the public, or a court if necessary. This task will serve as the culmination of the Trustee assessment of the lost recreational use impacts due to the spill.

Total Value

The total value assessment will estimate the value of lost passive and direct use of the injured natural resources. Major tasks include focus group script and other instrument development activities, including survey instrument testing, survey administration, data management and analyses, econometric/statistical modeling, report writing, and peer review. Focused research in support of the total value assessment will address economic and econometric theory, psychology, judgment, and decision-making associated with the development and implementation of the survey instrument and analysis of the data and interpretation of results.

The tasks outlined below are new/additional tasks undertaken and are supplemental to the previous assessment plans.

Task 26: Outreach and coordination with co-Trustees and public

Ongoing outreach and coordination with co-Trustees will be continued to ensure that the assessment efforts undertaken to date fully account for total value losses due to the spill, to help address questions or concerns about the methodology used throughout the assessment, and to prepare for comments from the public. A set of meetings are planned during the next year and half to allow co-Trustee technical representatives to interact directly with the team of Experts that developed the assessment. Additional meetings or outreach activities will be necessary during the DARP public comment period. These meetings and outreach activities require the participation of all, or a subset, or our Expert team to ensure that co-Trustees and the public have a full understanding of the set of decisions made, assessment techniques utilized, and the basis for the Trustee claim.

Task 27: Finalization of technical memos and reports

The primary work product of earlier assessment efforts is a set of approximately 25 Technical Memos which outline the data collection, modeling decisions, and outcomes of the earlier assessment tasks. These Technical Memos are currently in draft-final stages of completion; however, NOAA anticipates additional activities in FY2015 which will require NOAA and expert input. Specifically, these Technical Memos will need to be peer reviewed, updated to reflect potential comments from co-Trustees, and finalized so that all (or a subset) of them can be drawn from in the development of the technical appendices of the DARP, the final expert report, or both. The total value team will also prepare additional final expert report(s) as needed.

Task 28: Development/maintenance of Administrative Record

The Trustees are also organizing files, emails, memos, and datasets generated over the last four years into a comprehensive AR. Trustee technical staff and consultants will be sorting through these potentially relevant documents and attributing them based on attorney guidelines. The NOAA team will continue to respond to requests for documents to complete the AR. The costs of the NOAA team in gathering and providing these records for AR purposes is captured here.

Task 29: Analyses of new/expanded datasets and new literature reviews

Specific activities for this task include:

- Conduct analyses of construct validity and other data validity tests
- Conduct sensitivity analyses of analytical models
- Analyze and interpret results of new/additional supporting studies

Anticipated Deliverables

The following deliverables will be prepared as needed:

- Draft and final components of the DARP
- Finalized Technical Memos
- AR
- Final Expert Reports
- Documents associated with settlement
- Coordination calls and meetings

Level of Effort

The total estimated costs for activities are \$3.15M in contract and \$1.72M in agency funds. These costs include 12.7 contract equivalents and 2.6 agency FTE equivalents. Please refer Attachment A-6 for a detailed breakdown of costs.

Administrative Record

The NOAA team will continue to respond to requests for documents to complete the AR. This activity will include providing new documents and data related to human use losses. The costs of the NOAA team in gathering and providing these records for AR purposes is captured here; the costs of capturing and processing these records for AR purposes is captured under the AR Tasks.

H. Toxicity to Aquatic Organisms

Activity 15: Completing Toxicity Assessment for Aquatic Organisms

Our funding request is \$2.81M and focused on data analysis and interpretation. We projected the current costs with the understanding that this additional funding will cover data analyses, preparing data/test summaries, coordination with resource category groups, coordination with co-Trustees, injury assessment activities, meetings with BP, and any urgent toxicity testing needed to strengthen the injury assessment. Although we have undertaken many tests already, some have required repetition, some need to be replaced with other test species, and some new types of tests are needed to help interpret field data obtained for specific groups of animals not included in the prior rounds of toxicity testing.

Recent fish toxicity findings are available in peer-reviewed journals. All of the manuscripts inform our ongoing assessment of natural resource injuries. Incardona et al. (2013) describes protocols for generating dispersed oil water accommodated fractions in the size range detected in subsurface plumes in the Gulf. In zebrafish, MC252 oil and Alaska North Slope Crude Oil were shown to have similar phenotypic expressions of embryotoxicity. Other work focused on the hearts of large predatory pelagic fish (bluefin tuna, yellowfin tuna, amberjack), and toxicity test results show irregular atrial arrhythmia occurred in all species after exposure to MC252 oil (Incardona et al., 2014). Brette et al. (2014) described the cardiotoxic mechanism by which MC252 oil affected bluefin and yellowfin tuna heart cells. In other tests on juvenile mahi-mahi, swimming performance was decreased after exposure to MC252 oil and oil-exposed larvae after 48 hours showed a 4.5-fold increase in the incidence of pericardial and yolk sac edema related to controls (Mager et al., 2014). Although all of our previous aquatic toxicity findings are not yet available in reports, the toxicity work is a central and critical piece of the DWH injury assessment and will be used by all resource category groups to aid interpretation of their data and frame documented or modeled exposure concentrations in terms of likely resulting injuries. The following text provides detail on the toxicity work for the case and specific funding needs.

Toxicity to aquatic organisms

The primary goal of the toxicity investigations is to evaluate toxicological responses of representative Gulf of Mexico aquatic organisms, or appropriate surrogate species, to petroleum constituents and dispersants comparable to what was discharged by the Deepwater Horizon oil spill. Assessment activities

in the toxicity group are focused on understanding the exposure, pathway, and effects of oil and dispersant from the Incident on a variety of test animals. The laboratory toxicity data, as represented mostly through dose responses, will be used to help interpret empirical and modeled data representing field conditions, observations, and samples. As such, the toxicity studies serve a broad role in the overall case to explain or predict levels of injury to natural resources associated with a range of exposure conditions. The toxicity work will continue to be used by all resource category groups to aid interpretation of their data and frame documented or modeled exposure concentrations in terms of likely resulting injuries.

To assess the effects of oil discharged by the Incident, a variety of tests are conducted using representative Gulf of Mexico fish and invertebrate species. The lethal and sub-lethal toxicity of field-collected MC252 oil, artificially weathered MC252 oil, COREXIT 9500, and oiled sediments is evaluated using several exposure pathways and endpoints. Pathways investigated include water accommodated fractions of oil, exposure to oil droplets, exposure to oil slicks, exposure to oiled sediment, and ingestion of contaminated prey. The type(s) of oil used for test exposures depend on what oil(s) species were likely exposed to over the duration of the oil spill. Endpoints evaluated during these tests include survival, growth, reproductive metrics, development, tissue damage (histology), gene expression, immunological effects, other physiological injuries, and behavior. The majority of tests are focused on the effects to early life stages (e.g., embryo and larvae) or on adults during their reproductive cycles. The Trustee schedule of toxicity testing coincides with the reproductive season(s) for each test species when appropriate.

Species currently used or proposed for use in toxicity tests:

- Algae (*Skeletonema costatum*; *Isochrysis galbana*; *Chaetoceros muelleri*)
- Amberjack (*Seriola lalandi lalandi*)
- Amphipod (*Ampelisca abdita*)
- Amphipod (*Leptocheirus plumulosus*)
- Blackfin Tuna (*Thunnus atlanticus*)
- Blue crab (*Callinectes sapidus*)
- Bluefin tuna (*Thunnus thynnus* and *T. maccoyii*)
- Cobia (*Rachycentron canadum*)
- Comb jelly (*Mnemiopsis leidyi*, a.k.a. sea walnut)
- Copepod (*Acartia tonsa*)
- Diatom (*Skeletonema costatum*, TBD)
- Eastern oyster (*Crassostrea virginica*)
- Fiddler crab (*Uca spp.*)
- Goggle eye (*Selar crumenophthalmus*)
- Grass shrimp (*Palaemonetes pugio*)
- Inland silverside (*Menidia beryllina*)
- Killifish (*Fundulus grandis*)
- Mahi-mahi (*Coryphaena hippurus*)
- Marsh periwinkle (*Littoraria irrorata*)
- Moon jelly (*Aurelia aurita*)
- Mysid shrimp (*Mysidopsis bahia*)
- Pacific mackerel (*Scomber japonicus*)
- Polychaete worm (*Neanthes arenacoedentata*)
- Red drum (*Sciaenops ocellatus*)
- Red-eared slider (*Trachemys scripta elegans*)
- Sand dollar (*Dendraster excentricus*)

- Sea urchin (*Strongylocentrotus purpuratus*)
- Sheepshead minnow (*Cyprinodon variegates*)
- Southern flounder (*Paralichthys lethostigmata*)
- Snapping turtle (*Chelydra serpentina*)
- Speckled sea trout (*Cynoscion nebulosus*)
- Yellowfin tuna (*Thunnus albacares*)

Our request will cover additional following-up testing, any urgent toxicity testing needed to strengthen the injury assessment, data analyses, preparing data/test summaries, coordination with co-Trustees, injury assessment activities, meetings with BP, use of the empirical toxicity data to validate models, and support to resource category groups. The activity also includes compilation of documentation and records related to the activity. We will also continue some analytical chemistry testing of oil and dispersant formulations in water and/or sediment as needed. Contract expenditures are included to cover work by PIs and their teams to assist in the completion of the above tasks. The toxicity testing program has collected a tremendous amount of toxicity data since the inception of the program in 2010. Over 300 toxicity tests have been completed. Toxicity data have been going through the QA/QC processes in preparation for data analyses and interpretation. Once data have been fully QA/QC'd they are included in the database and will be incorporated into the injury assessment.

Connection to NRDA Process

The toxicity testing results will be used to produce dose-response curves and determine the water and sediment concentrations that are toxic to organisms. The Trustees' toxicity testing program considers field evidence of oil impacts to resources observed in large areas of the Gulf of Mexico and at different trophic levels and utilizes the laboratory results and dose-response curves to put the field observations in a toxicological perspective. The selection of species in the Trustees' testing regime is representative of many ecological niches or guilds that were affected by MC252 oil (using models or direct observations from field sampling). Incident-specific toxicity data is important because existing literature cannot address toxicity of the sweet crude oil spilled as altered by the unique scenario of deep sea release, associated biological and physical weathering, and mixing with a large volume of applied dispersants. Literature values do not exist for many of the representative Gulf of Mexico species that NOAA is and will be testing. The DWH oils that NOAA is utilizing for toxicity tests represent a variety of weathering states and a unique combination of oil constituents. For Gulf of Mexico species that have literature values for a similar type of sweet crude oil, the testing was typically done using unweathered oil, which is not representative of many exposure conditions during the Incident. Additionally, the toxicity testing that NOAA will conduct is using current scientific testing and analytical methods with sensitive endpoints such as early life stage development, cardiac function, immune function, and gene alterations – a combination that represents a more comprehensive and improved approach than found in most previously published studies.

Results from the toxicity tests may be used to calculate direct loss of animals in areas affected by oil or contribute to service loss estimates in various habitats. Restoration specialists will consider the spatial scale and magnitude of resource or habitat injuries supported by the toxicity test results and target restoration projects or types that have a close geographic or resource nexus to the injuries.

Data/Deliverables Produced

The sum total of the individual toxicity tests that NOAA expects to conduct will be around 400. The endpoints evaluated during these tests include survival, growth, reproductive metrics, development, tissue damage (histology), gene expression, immunological effects, and behavior. An individual test can produce hundreds to thousands of individual data points. The data from all of these 400 tests will require robust statistical analysis and interpretation. NOAA has selected a team of statisticians for this purpose. Based on recommendations of the statisticians, data will be analyzed and reported through summaries to account for statistical power and appropriate presentation of the results. Data will be examined to look for trends within a species, among species, and within ecozones (nearshore, offshore, and deep water). The anticipated deliverables will be data summary reports and internal reports including data interpretation. Individual resource category groups will also be using the toxicity data in their assessments, models, and data interpretations. The toxicity group will be working with the resource category groups to integrate the toxicity data in the injury assessment. The proposed budget accounts for a limited amount of vetting drafts and revisions through multiple steps of review by the case teams and any needed coordination with co-Trustees.

Once all toxicity testing data records are complete and the quality review conducted, the data are published by the DMT to different repositories external to the NOAA Trustee group. We will coordinate with end-user system contacts to ensure new data are represented correctly in the end-user systems.

These data management tasks are necessary to comprehensively maintain and ensure proper document and data preservation and develop consistent data suitable for application in the damage assessment. Through the tracking and integration process, the DMT works to consolidate the information in the case into organized and comprehensive repositories. The tracking of analysis product data usage helps ensure that all TWGs are using consistent, up-to-date data products. The effort to maintain the infrastructure for those repositories and conduct the QC for the records is represented in separate data management-specific procedures.

Level of Effort

We are requesting \$2.21M in contract dollars for this activity, which includes 10.1 contract equivalents and associated costs of travel and equipment. We also are requesting \$605,300 of agency funds, which includes 2.1 agency FTE equivalents. The number of FTEs and contract equivalents are based on key personnel from the NOAA, NOAA contractors, and the twelve laboratories working to, among other tasks, QA/QC data, analyze data, run statistical analyses on the data, and assist with the assimilation of the data into the resource injury assessments. Please refer Attachment A-6 for a detailed breakdown of costs.

Approximately two FTE personnel will handle all technical, legal, and coordination tasks related to this large testing program. NOAA is using two contract equivalents at the Office Support, Contract Support, Support Associate, Research Associate, Associate, Senior Associate, Manger, and Officer levels to help oversee the subcontracts with the individual laboratories, assist coordinating with the Trustees and RP, and assist with inter-lab coordination and data sharing.

PIs (NOAA and other)

Institutions and PIs currently under contract (as of June 2014) to NOAA for conducting laboratory-based toxicity work include: Dr. James Stoeckel (Auburn University); Dr. Aswani Volety (Florida Gulf Coast University; Note: Dr. Volety is moving to University of North Carolina Wilmington during the Summer of 2014, and a contract with UNCW is pending); Dr. Fernando Galvez (Louisiana State University); Dr. James Oris (Miami University of Ohio); Dr. Barbara Block (Stanford University); Dr. Carys Mitchelmore (University of Maryland); Dr. Martin Grosell (University of Miami, Rosenstiel School of Marine and Atmospheric Science); Dr. Aaron Roberts (University of North Texas); Dr. Robert (Joe) Griffitt (University of Southern Mississippi, Gulf Coast Research Laboratory); Dr. Guilherme Lotufo (United States Army Corps of Engineers); Dr. Tania Weiss (Marin Biologic); and Dr. Scott Ogle (Pacific EcoRisk).

PIs related to the management of data for this procedure include: Amy Merten (NOAA), Ben Shorr, (NOAA), Daniel Hudgens (IEc), Tyler Vick (MFA), Peggy Myre (Exa), Jay Coady (IMSG), and Jim Anderton (Solea). Attachment A-5 provides further details of PI qualifications.

Administrative Record

The NOAA team will continue to respond to requests for documents to complete the AR. This activity will include providing new documents and data related to toxicity testing and analyses produced. The costs of the NOAA team in gathering and providing these records for AR purposes is captured here; the costs of capturing and processing these records for AR purposes is captured under the AR Tasks.

I. Chemistry

Activity 16: Analysis, Interpretation, and Integration into Exposure Assessment

Since 2010, tens of thousands of samples have been collected for chemical analysis for the presence and concentration of contaminants associated with the Deepwater Horizon oil spill, such as PAHs, Volatile Organic Compounds, metals, and Dioctyl sodium sulfosuccinate (DOSS). Many of these samples have also required specialized analytical testing to support forensic interpretation linking them to the Incident. The principal NRDA laboratories conducting the oil-related and dispersant-related contaminant analysis (and associated testing such as grain size, total organic carbon, and lipids) are Alpha Analytical, TDI-Brooks, and Analytical Laboratory Services Environmental.

We anticipate that there will be a need to analyze 350 samples for PAHs, petroleum biomarkers, DOSS, and/or related tests at Alpha, TDI-Brooks, and/or Analytical Laboratory Services Environmental. This is in addition to the samples budgeted for analysis in the Third IPC.

- 100 samples are estimated from the Shoreline or Oyster work groups, and from opportunities to collect newly stranded oil or other samples after storms disturbance of the nearshore environment.
- 150 samples are estimated from those brought to us by co-Trustees in 2015, as has typically occurred in previous years. These requests occur because in the process of conducting assessment work, TWGs become aware of data gaps and opportunities to request additional analysis to fill the gaps. Many of these analyses also derive from BP requests.

- 100 samples are estimated that will require forensic interpretation necessitating additional analysis, or full alkylated PAH and biomarker analysis where previously samples were only screened for Total Petroleum Hydrocarbons.

In addition to the analysis of samples, agency and contract funds are requested for the in-depth interpretation of chemistry and other data, and for the preparation of documentation supporting the comprehensive exposure assessment for the draft DARP. Forensic chemists will participate in the preparation or review of portions of the draft DARP. The forensic analysis and evidence of exposures to contaminants will be divided into specific subsets of the case including the deep benthic environment, the offshore water column and surface waters, the nearshore environment, shoreline habitats, and natural resources associated with these environments. The information from forensic analysis and exposure evidence will be used to support the injury assessment and scaling work across the entire damage assessment.

Sample/Data Handling

Funding is requested for a variety of data management activities associated with the analysis, interpretation, and integration of chemistry information into the exposure assessment:

- Maintenance of original field data as well as associated analytical results in secure data repositories (e.g., NOAA NRDA.ORG, Environmental Response Management Application (ERMA), DIVER), including associated server, data transfer and storage space costs;
- Maintenance of data retrieval/sharing websites to ensure Trustee-wide access to data while maintaining associated metadata (e.g., data history / change logs);
- Storage of physical data; and
- Physical delivery of lab data to Trustee and RP representatives per data sharing agreements.

The data management process includes coordinating analytical activities; data tracking activities to provide status reports on analytical progress and data availability; third-party validation of lab results to ensure data is in proper format and meets quality standards; secondary QA/QC of field data prior to merging with lab results; incorporation into repositories as final, validated products; forensic chemistry to identify source of contamination; and spatial processing and loading into ERMA.

Several data sharing tasks are routinely undertaken as new data are available:

- Coordinate the seven-day view period to apprise RP and Trustee leads when new data are pending publication to a public repository;
- Post associated data validation reports to assist RP and Trustee leads in the seven-day view activities;
- Conduct review of data deemed ready for posting to ensure all information has been reviewed and is ready to share; and
- Coordinate with end-user system contacts to ensure new data are represented correctly in the end-user systems.

Once data records are complete and the quality review conducted, the data are published to different repositories external to the NOAA Trustee group. In particular, the data team focuses on posting

information for use by the public. These data management tasks are necessary to comprehensively maintain and ensure proper document and data preservation and develop consistent data suitable for application in the damage assessment. Through the tracking and integration process, the DMT works to consolidate the information in the case into organized and comprehensive repositories. The tracking of analysis product data usage helps ensure that all TWGs are using consistent, up-to-date data products. The effort to maintain the infrastructure for those repositories and conduct the QC for the records is represented in separate data management-specific procedures.

Level of Effort

Our request is for \$3.41M in contracts and \$52,400 in agency funds. These costs include 0.2 Agency FTEs and 10.0 contract equivalents. The large majority of contract funds is for scientists to conduct forensic evaluations of oil chemistry information. \$400K is requested for analytical laboratories to cover the analysis of 350 environmental samples. Please refer Attachment A-6 for a detailed breakdown of costs.

PIs (NOAA and other)

The PIs for laboratory analysis are: Dr. Nancy Rothman (New Environmental Horizons, Inc.), Dr. Ann Jones (IEc), Dr. Gregory Salata (Analytical Laboratory Services), Wendy Wong (NewFields/Alpha), Juan Ramirez (TDI-Brooks), Ann Bailey (EcoChem) and Julie Hall (EcoChem). The interpretation and integration into exposure assessment PIs are Dr. Scott Stout (NewFields), Dr. Gregg Douglas (NewFields), Steve Emsbo-Mattingly (NewFields), James Payne (Payne Environmental Consultants, Inc.), and William Driskell (Payne Environmental Consultants, Inc.). Attachment A-5 provides further details of PI qualifications.

Administrative Record

The NOAA team will continue to respond to requests for documents to complete the AR. This activity will include providing new documents and data related to laboratory and forensic analyses. The costs of the NOAA team in gathering and providing these records for AR purposes is captured here; the costs of capturing and processing these records for AR purposes is captured under the AR Tasks.

J. Data Management and Visualization

Activity 17: Infrastructure and Data Update Process

An unprecedented quantity of samples, instrument files, photographs, video recordings, and visual observations were acquired to assess the impact of the MC252 oil spill and plan for future restoration. For example, data from over 20,000 field event collections, comprising over one million individual field data forms and associated files, have been generated and uploaded to the file collection repository. Similarly, seven million contaminant chemistry sample analytical result records have already been generated and maintained in the database repositories, including NOAA NRDA, response, and historic data. An additional half million records provide tracking of the instrument data, photographs, telemetry data, and observation data. The data management TWG has led and continues to lead the effort to ensure the

preservation of all such files and data. This activity encompasses the overarching data architecture-related strategic planning and oversight, infrastructure maintenance, data update processes, training, and documentation tasks conducted by the team.

Strategic Planning and Coordination

The leads for the NOAA DMT conduct wide-ranging activities in support of the NRDA and in order to integrate between the individual data categories included below. In particular, the data management leads conduct extensive coordination with case leads, general counsel, and RP representatives. Through such discussions, they facilitate access to the data, coordinate questions regarding data applicability, and facilitate meetings with RP representatives to review data sharing requirements.

Infrastructure

NOAA directs the architecture, development, management, and oversight of the data repositories used in the assessment and restoration efforts. These repositories include ERMA, noaanrda.org, DIVER, Photologger, and Query Manager. Activities associated with this infrastructure include:

- Maintenance of the information management servers, including server patching and rebooting of separate production, testing, and development environments
- Implementation and maintenance of security systems as required for government systems
- Preparation and maintenance of security policies as required for government systems
- System backups
- Infrastructure monitoring, such as data drive space and memory allocation
- Maintenance of overarching data retrieval and information sharing tools
- Configuration and maintenance of online collaboration tools
- Configuration of new data storage arrays and databases

Training and Support

In addition to managing the overall data infrastructure, the DMT provides training and support to the various end users. The community of representatives from the RPs and from Trustee organizations is large. The data management group supports these users through both focused training sessions as well as responses to ad hoc requests. Such activities include:

- Conduct regular training sessions on the data systems for new Trustee users
- Develop user help documents to provide ongoing support in using the data tools
- Track user submitted requests to the system support account
- Respond to system related requests
- Coordinate connections between individual making the request and other related experts for study-specific or chemistry-related questions

Data Update Process

On a regular basis, as warranted by the quantity of newly available data or specific case needs, the data team refreshes the content within each of the data systems. For example, as new historic data becomes available, we anticipate integrating such information to assist in characterizations of the baseline conditions. Such data updates include coordination between the system administrators, running automated update tools, conducting overarching tests to ensure data were transitioned correctly, and then posting the data to the Trustee, RP, and publicly available sites.

In addition to maintaining the flow of data for NOAA NRDA-collected information, the DMT will also be responsible for integration of data collected and provided by the RP. The DMT will review information provided by the RP; will conduct data categorizations; and where applicable to the NRDA case assessment and restoration activities, will integrate the information into the common data models to facilitate use by resource groups. The systemic data update process in this activity is in addition to the data management team actions described in our resource-specific activities.

Documentation

As part of the assessment process and due to the expansive volume of data collected, comprehensive documentation is necessary to fully record the processes applied and updates made to the data. Under this activity, the DMT will develop comprehensive documentation of all aspects of the data management process, including data intake, tracking, integration into source systems, and publishing via end user data systems. In addition to this overarching documentation, the DMT works to acquire and share important metadata regarding each source system and, where applicable, datasets. This information is then integrated into the metadata records required for sharing spatial data.

In response to government requirements for data systems, the DMT will also conduct a detailed review of the security layers associated with the data repositories. Through the review, the team will update the comprehensive documentation required for ongoing maintenance and hosting.

Data/Deliverables Produced

The information management systems are actively managed on a daily basis to ensure continued access to NRDA and related data by the Trustees. System functionality changes are released on a periodic basis, as necessary.

Level of Effort

Our request is for \$7.18M in contract funds and \$730,300 in agency funds. These costs include 2.6 Agency FTEs and 22.1 contract equivalents for NOAA staff, Non-NOAA PIs and technical experts (subcontracted under IEc), and contract support from IEc. Please refer Attachment A-6 for a detailed breakdown of costs.

PIs (NOAA and other)

PIs for this task include: Ben Shorr (NOAA), Kevin Kirsch (NOAA), George Graettinger (NOAA), Michele Jacobi (NOAA), Kari Sheets (NOAA), Dan Hudgens (IEc), Dr. Ann Jones (IEc), Neal Etre (IEc); Jim Anderton (Solea); Peggy Myre (Exa), and Scott Byron (Sirius). Attachment A-5 provides further details of PI qualifications.

Timetable

The NRDA activities will occur continuously during the period of the Claim.

Administrative Record

The NOAA team will continue to respond to requests for documents to complete the AR. This activity will include providing new documents and data related to systematic data updates and NRDA data management infrastructure. The costs of the NOAA team in gathering and providing these records for AR purposes is captured here; the costs of capturing and processing these records for AR purposes is captured under the AR Tasks.

Activity 18: Address End User System/Tool Needs

Previously, as part of this NRDA and as part of other NOAA activities, the NOAA DMT designed and developed various information management tools to collect, store, manage, and analyze information collected as part of the case. These repositories include ERMA, noaanrda.org, DIVER, Photologger, and Query Manager. Under this task, the NOAA DMT anticipates making ongoing changes and updates to the tool sets to accommodate new information collected and to address requests of NOAA case management.

Updates to the tools will require significant programming effort and focus on features that:

- Decrease the time required by case team members to access new data and obtain revisions
- Decrease the infrastructure and data update support costs over time
- Improve the interconnections of related data (e.g., allow users to identify sample results collected in or around particular instrument results)
- Provide Trustee to new datasets not currently integrated into the systems (e.g., model results)

Connection of Activities to NRDA Process

These overarching activities, while not specific to a particular task or TWG, are necessary to facilitate data access and improve the efficiency of data searching and analysis.

Data/Deliverables Produced

The information management systems are actively managed on a daily basis to ensure continued access to NRDA and related data by the Trustees. System functionality changes are released on a periodic basis, as necessary.

Level of Effort

Our request is for \$1.67M in contract funds and \$48,400 in agency funds. These costs include 0.2 Agency FTEs and 4.8 contract equivalents for NOAA staff, Non-NOAA PIs and technical experts (subcontracted under IEc), and contract support from IEc. Please refer Attachment A-6 for a detailed breakdown of costs.

PIs (NOAA and other)

PIs for this task include: Ben Shorr (NOAA), George Graettinger (NOAA), Jim Anderton (Solea), and Jerry Bower (Sirius). Attachment A-5 provides further details of PI qualifications.

Timetable

The NRDA activities will occur continuously during the period of the Claim.

Administrative Record

The NOAA team will continue to respond to requests for documents to complete the AR. This activity will include providing new documents and data related to programming changes in major NRDA databases. The costs of the NOAA team in gathering and providing these records for AR purposes is captured here; the costs of capturing and processing these records for AR purposes is captured under the AR Tasks.

Activity 19: File Integration / Server Consolidation / Long-Term Archive

In development of the injury assessment, NOAA has collected an unprecedented volume of data and is performing a comprehensive analysis. NOAA applies multiple strategies for the collection, management, and sharing of the information. NOAA NRDA.org serves as the core data repository (see Data Management: Infrastructure and Data Update Process) for acquiring, storing, and sharing the vast majority of data produced. NOAA's NIMO system (see DWH Electronic Content Management System and Oil Pollution Act AR) will manage the consolidated files associated with the AR. Meanwhile, many additional systems are maintained by researchers conducting the injury analyses in order to undertake and document their work.

As part of the final goal of the DARP, the NOAA team must ensure that we maintain the underlying data stored on systems outside of the core noaanrda.org or NIMO repositories and associated with signed work plans that affect injury assessment analysis, interpretation, quantification, scaling, and ultimately inclusion into restoration planning documents. These files are maintained on a large number of computer systems, many of which were procured and setup after the Incident. After five years, much of the infrastructure is reaching the end of its useful life. As such, we anticipate challenges to protect the data collected under the prior funding years. For example, PIs will need to transmit large volumes of data to the noaanrda.org repository and/or replace aging equipment to ensure that the data are accessible.

Under this task, the team will meet its obligations to preserve the data used in the analysis for later public involvement (§ 990.14) and support downstream information processing and dissemination activities ("Open Data Policy" (OMB M-13-13) and Executive Order "Making Open and Machine Readable the New Default for Government Information"). As teams complete their analysis and information is integrated into the restoration planning documents, the NOAA DMT will coordinate with the principal investigators to ensure that the records are maintained at each source system until such time as the centralized system is complete and source systems can be shut-down. The scope of the work shall include providing assistance to PIs with technical support needs for maintaining the computer systems, coordinating the move of data from the source locations to long-term repositories, and assisting in procurement efforts to obtain replacement hardware as necessary.

Similarly, NOAA is responsible for the long-term archiving of all data collected under the case. As such, under this activity, we anticipate coordinating within NOAA to determine appropriate options for long-term handling of the data. This may include the maintenance of the noaanrda.org and related systems into the foreseeable future and/or identification of a repository suitable for a longer-term holding that provides ongoing public access. Under this task, we will prepare a written plan summarizing the approach to meeting the long-term public sharing requirements.

Connection of Activities to NRDA Process

These overarching activities, while not specific to a particular task or resource group, are necessary to continue maintenance and sharing of the data and files collected under the case and to meet NOAA's long-term storage needs.

Data/Deliverables Produced

File integration efforts will be conducted on an as needed basis. Development of the long-term archive plan is anticipated by September 2015.

Timetable

The NRDA activities will occur continuously during the period of the Claim.

Level of Effort

Our request is for \$896,100 in contract funds and \$145,200 in agency funds. These costs include 0.6 Agency FTEs and 2.4 contract equivalents for NOAA staff, Non-NOAA PIs and technical experts (subcontracted under IEC), and contract support from IEC. Please refer Attachment A-6 for a detailed breakdown of costs.

PIs (NOAA and other)

PIs for this task include: Kevin Kirsch (NOAA) and Daniel Hudgens (IEC). Attachment A-5 provides further details of PI qualifications.

Administrative Record

The NOAA team will continue to respond to requests for documents to complete the AR. This activity will include providing new documents and data related to plans to store NRDA data long-term and manage servers. The costs of the NOAA team in gathering and providing these records for AR purposes is captured here; the costs of capturing and processing these records for AR purposes is captured under the AR Tasks.

K. Injury Assessment Management and Administration

Activity 20: Injury Assessment and Legal Case Management

This activity includes Incident-wide case management and administration costs. The NOAA 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 NOAA's assessment activities at the technical level. Tasks include all budget planning/execution and Trustee Council activities. Also included in this activity are costs for attorneys from NOAA's General Counsel for Natural Resources that are supporting injury assessment activities full-time and whose duties support multiple assessment procedures. Case management and legal costs for restoration planning are described in the restoration activity.

This activity also includes contracts management and accounting support from IEC to oversee their approximately 135 subcontracts and multiple funding streams under the contract. The proposed costs are for contract administration activities directly related to the DWH NRDA. This work by IEC is complementary to but separate from NOAA's case-wide administration work. The IEC work includes processing invoices submitted by subcontractors working on the NRDA, preparing invoices for submission to NOAA, processing contract modifications, reviewing subcontractor cost proposals, processing requests for subcontractor consent, monitoring contract funding, preparing work plans, procurement, tracking contract costs, administration of equipment tracking systems, and communications with NOAA regarding these items. Work on these tasks is billed directly to the project and is therefore not included in IEC's indirect rate and is not included in costs for any other activities in this Claim. The activity also includes required compilation of documentation and records related to subcontractor oversight, financial status reporting, and field operations.

Case-wide field operations support is also included in this activity. In order to manage the logistics associated with an environmental assessment of this magnitude, NOAA created the Field Operations Team (Field Ops). The mission of Field Ops is to ensure the safety of and provide logistical support to all field teams working on the DWH NRDA. To accomplish this, Field Ops develops and provides training in logistics, sample handling, data management, and safety protocols for all field staff. During sampling events, Field Ops services are available from seven in the morning to seven at night, seven days a week. Furthermore, when field teams are actively sampling, a member of the team is always available via an emergency phone line. Field Ops provides a range of logistical support services during all phases of the assessment (Figure 1). Funds will support five part-time contractors, an incident-wide safety officer, a specialist with vessel procurement, and several other contract staff that assist with safety and logistics issues. Case-wide field operations costs are separate and distinct from costs in any other procedures in the Claim.

Development & Implementation of Field Work: Field Ops assists the TWG with developing and testing equipment and field methods. As a study plan or field planning enters the final stages of development, IEC assigns a Field Ops liaison to manage all aspects of its implementation. This individual is responsible for logistical, staffing, and equipment issues prior to field work. To accomplish this, the team member participates in TWG conference calls, evaluates site accessibility, evaluates equipment needs, evaluates safety training needs, and participates in field-based methods testing. Furthermore, they work with the TWG to determine the optimal number of field teams and the size of each field team required for the work to be completed most efficiently. Plan implementation encompasses everything from procuring equipment and field staff to maintaining a historical database of field sampler names and contact information. The major responsibilities associated with plan implementation include the following activities:

- **Equipment Procurement:** The Field Ops liaison works with the TWG to develop a list of all necessary equipment, including safety equipment that is not specific to the work plan (e.g., first aid kits). Field Ops then assists with ensuring that all equipment is procured properly.
- **Staffing:** The Field Ops liaison is responsible for identifying appropriate field support staff. This activity involves reviewing the resumes of potential field staff and assessing availability of qualified staff. Once the study plan is agreed upon and qualified field samplers are identified, the field staff must be orientated to our NRDA procedures. To accomplish this, Field Ops works with

the TWG lead to develop and deliver multi-day training sessions for all participants. These training sessions vary in size from approximately 20 to over 100 attendees. To ensure successful implementation, the Field Ops liaison works with other technical staff and the TWG lead to develop an agenda, reserve training facilities, coordinate travel for attendees, and develop presentations and handouts.

- **Safety and Security Clearances:** Field Ops is responsible for ensuring that all field staff have completed the necessary safety training courses and obtained the necessary security and medical clearances to participate in study plan implementation. Field Ops is responsible for gathering all necessary documentation and ensuring that security and medical clearances are obtained in a timely manner. In addition, specific study plans require a Job Hazard Analysis, which Field Ops develops under the auspices of NOAA's safety lead and on-site coordinator.
- **Nearshore Vessel Coordination:** As the majority of nearshore work requires the use of a vessel, procuring and scheduling vessels are an essential part of any field assessment. To accomplish this, Field Ops has developed and maintains a small vessel procurement program. They work with the field samplers, TWG leads, and vessel operators to identify the appropriate style and size vessel and arrange daily launch location which can vary depending on tidal conditions and wind direction. In addition to scheduling each vessel, the Field Ops staff inspects every vessel for safety, maintains a record of each inspection, ensures that each field sampler confirms that the vessel being used on each day has been inspected, and reviews vessel operator documentation (e.g., coast guard licenses).
- **Daily Mission Plans:** Each field assessment has a predetermined list of sampling sites. As logistical constraints (e.g., weather and tides) often do not allow for the sites to be sampled in the predetermined order, a daily mission plan must be developed and disseminated to each field team. Each night, Field Ops, in consultation with the TWG leads, develops and distributes a daily mission plan. Additionally, the Field Ops liaison arranges for intake of that day's samples. If the field teams are in need of additional sampling equipment, Field Ops will also coordinate to have the gear delivered at the time of sample intake. Lastly, Field Ops regularly coordinates an evening conference call for each assessment to discuss the day's events and answer any questions pertaining to the next day's goals.

Team Tracking: We plan for Field Ops to coordinate as many as five to ten field teams at any given time. These teams are deployed throughout the Gulf of Mexico in a wide range of remote and potentially dangerous environments. To ensure the safety of the field staff and to maintain emergency support capacity, Field Ops tracks the location of every team. Each day Field Ops maintains a live electronic record of each team's participants, emergency contact information, operational area, and the time and location of multiple safety checks throughout the day. In addition, Field Ops maintains and provides each team with a GPS locating device that allows Field Ops to track the team in real time. This is essential because Field Ops continuously monitors the weather for isolated, but severe, thunderstorms, which are common in the Gulf of Mexico. If the weather radar indicates that severe thunderstorms are forming in the general vicinity of a field team, Field Ops will notify the team and instruct them to suspend sampling. Field Ops also monitors emergency beacons carried by each team, and they are trained to deploy emergency response personnel if required.

A fully functioning Field Ops, whose costs are separate and distinct from costs in any other procedures in the Claim, is essential to ensure the safety of all field sampling personnel and the efficient implementation of all field study plans.

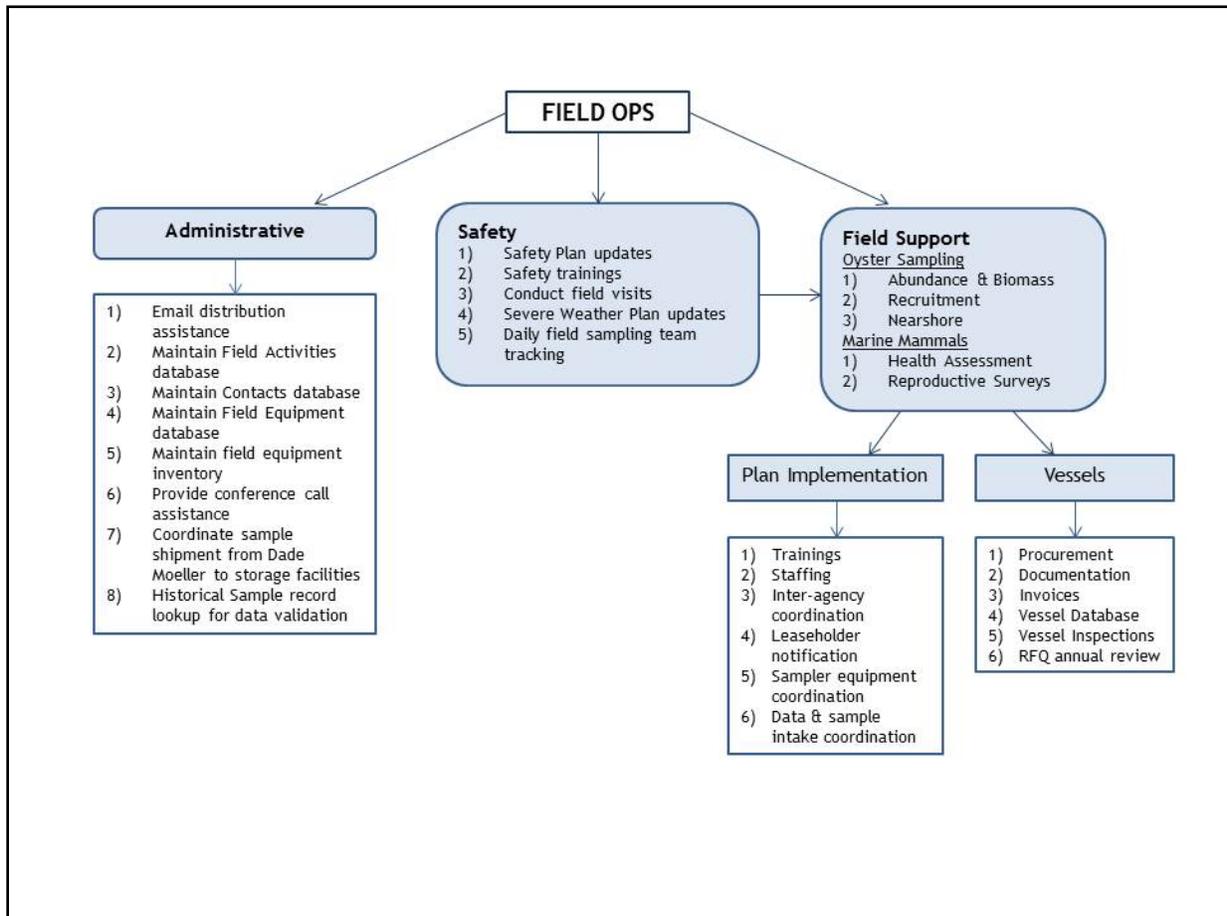


Figure 1. Description of Field Ops Tasks

Level of Effort

Our request for the injury assessment and legal case management activity is \$1.95M in contract funds and \$3.22M in agency funds. Our request includes 10.6 agency FTEs and 9.5 contract equivalents. Key personnel include six nearly full time Assessment and Restoration Division managers and six full-time assessment/case-management attorneys from NOAA’s General Counsel for Natural Resources. NOAA costs under this procedure represent 15% of the total agency request for this Claim. Key personnel from IEc, most of whom work part-time on the activity, include IEc’s Program Director, Contract Services Manager, one Sr. Contract Administrator, seven Contract Administrators, a Procurement Specialist, five New Orleans Field Ops staff, four Cambridge Field Ops staff, and a safety officer. IEc Field Ops level of effort represents a 28% decrease compared to the Third IPC to reflect the moderate decrease in field work. IEc costs under this procedure represent 3% of our total contract request under this Claim. Please refer Attachment A-6 for a detailed breakdown of costs.

PIs (NOAA and other)

NOAA management will lead this activity.

Timetable

The NRDA activities will occur continuously during the period of the Claim.

Activity 21: Deepwater Horizon Electronic Content Management System and Oil Pollution Act Administrative Record

Activities undertaken in 2014 continued development, management, and improvement of the DWH Electronic Content Management System (ECMS) and an automated workflow within that system supporting NOAA DWH OPA AR development. The electronic system, nicknamed “NIMO” in 2014, is nearing full operation. The start of ECMS operations in 2013 was stymied by a series of delays, including in contracting actions and in planning for and managing hardware relocation. Other ECMS supporting activities continued undeterred. During CY 2014, the DWH ECMS Team worked closely with NOAA staff, managers and contractors to implement guidelines and procedures for the identification and collection of DWH content to several interim staging points. As of mid-2014, 120 individual custodians have delivered ~500 GB of documents; and NOAA staff associated with 13 TWGs and the Restoration Center have delivered an initial ~12,600 documents (23GB) to three staging points. Planning for the identification and integration of ECMS content materials from hundreds of sources and disciplines proved to be a challenging aspect of the development of this system in 2014 and those challenges continue.

Using requested funds, ECMS and NOAA DWH OPA AR activities will be a continuation of organized document collection, development of workflow processes, legal review of documents within the AR workflow, management, and improvement of these systems, and will preserve and provide for accessibility and long-term maintenance of this information as NOAA NRDA work progresses. Document collection from a widely dispersed workforce requires focused oversight and planning by the DWH ECMS Team comprised of NOAA professional staff assisted by contract expertise and services to assure accurate and complete transfers of electronic materials. Document collections will continue to expand and be updated from a wide range of NOAA employees and contractors in relevant line and staff offices. Preservation of relevant material through the ECMS will continue to depend on the use of regulatory compliant software, well operated, managed and maintained servers and storage equipment within a trustworthy records system that can be relied upon to meet the highest standards.

NOAA employees require access to DWH-related information in a system where it is organized and can be located, searched, retrieved and read. The ECMS allows NOAA staff and contractors to capture, categorize, associate, retain, manage, search, review, mark, tag, share, and export the content using an internal-facing, permission-based web link.

The continuing NOAA DWH OPA AR development process is a critical OPA compliance activity⁷ that is supported and enabled within the ECMS. NOAA DWH OPA AR processing is a complex system workflow within the ECMS that automates and supports the major components of NOAA DWH AR development to make the most effective use of staff resources. Legal review for completeness of the collection in various subject categories is essential to providing a DWH OPA AR that is sufficient to identify agency actions and decisions, information considered, and full explanations of scientific inquiries, analyses and conclusions. The DWH OPA AR will be, in its final form, a publicly accessible collection that is intended to include documents considered by NOAA and/or its co-Trustees during the pre-assessment, assessment, and restoration planning phases of the NRDA performed in connection with the Incident.

System Content Description

Valuable content related to NOAA's ongoing study of the oil spill's effects on natural resources, including habitats and species in and using the Gulf of Mexico, continues to be created and stored in locations across NOAA line and staff offices and behind multiple fire walls. Systematic collection of relevant records, based on content guidance is underway and is ongoing in order to centralize these DWH electronic documents into the ECMS repository. This content has critical operational, regulatory compliance, and strategic value.⁸ By the end of CY 2014, the DWH ECMS Team projects the system will hold up to 900GB of content in support of NOAA's NRDA efforts and that regular collection and upload of documents will grow the repository significantly.

Level of Effort

The total estimated cost for new effort (ECMS and NRDA AR Workflow operations, management, maintenance, review, software, equipment and associated tasks) is \$3.38M. We request \$1.94M in contracts and \$1.44M in agency funds. These costs include 5.5 agency FTEs and 5.8 contract equivalents.

These estimates were based on the ongoing potential scope of this effort (and costs) across all of NOAA's DWH and continuing NRDA activities, the volumes of records that will require processing and review, the ongoing requirements to oversee, manage, and improve the systems, and to ensure accessibility and long-term maintenance of this information. Please refer Attachment A-6 for a detailed breakdown of costs.

Timetable

The DWH document preservation collection and the NRDA-related AR activities will occur continuously during the period of the Claim.

⁷ The Trustees announced the establishment and opening of the Administrative Record for this NRDA October 1, 2010. (See Notice of Intent to Proceed with Restoration Planning, 75 Fed. Reg. 60800, at 60802). The AR was opened to comply with 15 CFR 990.44 and 45.

⁸ The requirement, under the Federal Records Act (1950) and current regulations, that agencies manage records in a legally compliant manner is met by the current software application and records management support assigned to the system.

L. Restoration Planning Activities

Restoration Planning Activities described below support NOAA’s ability to complete a public review draft of the DARP. On October 3, 2014, we sent a claim that outlined restoration planning procedures that support the development of restoration actions and the development and evaluation of restoration alternatives. Activities described below are those necessary to complete restoration alternative analysis; select the preferred alternative; develop a draft DARP, PEIS, and other supporting documentation; and prepare for public meeting requirements.

Restoration planning activities are presented in five categories. Leadership, Management, and Oversight, Finance, Data Management, and Communications are critical activities that support progress and milestones achieved in finalizing component analyses and decisions and documenting them in a public review draft DARP.

Fourth IPC Planning Categories
Leadership, Management, and Oversight
Finance
Damage Assessment and Restoration Plan, Programmatic Environmental Impact Statement, and Associated Regulatory Compliance
Data Management
Communications

Leadership, Management, and Oversight

Managers, supervisors and senior staff, including attorneys with NOAA General Counsel for Natural Resources will oversee OPA restoration planning activities to integrate analysis, interim products, and Trustee reviews into draft OPA and National Environmental Policy Act (NEPA) documents that are ready for public review. That work includes prioritizing and coordinating the day-to-day work of teams composed of both Agency and contract personnel. Coordinating and communicating relevant information on the progress and status of ongoing efforts with the DOC, other NOAA line offices, federal co-Trustees and other federal entities (e.g., the Council on Environmental Quality and the United States Army Corps of Engineers), state co-Trustees, the Trustee Council and Executive Council, members of Congress, and a variety of interested non-governmental organizations, local governments, and members of the public also falls upon senior managers, supervisors and senior staff. Additionally, senior managers are responsible for the broad financial oversight and fiscal management of restoration planning funds.

In addition, NOAA staff will work with the Trustees to codify approaches to the overall Trustee Council support structure and governance requirements for long term restoration, including standard operating procedures, protocols, common terms of reference, and internal controls. These requirements will be agreed to and codified in the Trustee Council’s governing documents.

For the purposes of this Claim presentment, labor for managers, supervisors, General Counsel for Natural Resources support of Restoration Planning activities, and some senior staff is being budgeted under the single category of Leadership, Management, and Oversight despite their active participation in

multiple Restoration Planning categories.

Level of Effort

A total of \$1,221,500 is projected for this requirement, which includes 3.2 agency FTEs and 0.5 contractor equivalents⁹. Please refer Attachment A-6 for a detailed breakdown of costs.

Other requirements for this effort: There are no contract requirements under Leadership, Management, and Oversight. Travel costs for personnel across all restoration planning activities are included in this category and are projected at \$260,300.

Total required for Leadership, Management, and Oversight: \$1,481,800

Finance

Finance team activities are ongoing and include budget planning, tracking and execution as well as documenting expenditures for cost recovery. The finance team will support contract or other procurement vehicle requirements for major restoration planning expenditures for finalizing internal products and developing OPA and NEPA documents for public review. Finance staff apply knowledge of both agency policies and Federal Acquisition Regulations in order to meet day-to-day budget execution requirements.

Additionally, cost recovery teams compile documentation for all NOAA program offices engaged in DWH restoration planning. Contract and Agency personnel track, review, and compile all supporting cost documentation needed to satisfy all requirements. All cost documentation packages undergo both internal NOAA review and external third-party validation prior to submission to BP or NPFC.

Level of Effort

A total of \$604,500 is projected for this requirement, which includes 0.8 agency FTEs and 1.4 contractor equivalents.

Other requirements for this effort: There are no contract or other support requirements under Finance.

Total required for Finance: \$604,500

Damage Assessment and Restoration Plan (DARP), Programmatic Environmental Impact Statement (PEIS), and Associated Regulatory Compliance

NOAA will use funding provided through this Claim to finalize restoration planning analysis; select

⁹ Because NOAA staff are working across this and other restoration planning categories, the number of staff working under any one category is dynamic. Consequently, actual labor effort within any category may shift between planning activities from projections.

preferred restoration alternatives; develop a draft DARP, PEIS, and other supporting documentation; and prepare for public meeting requirements. NOAA is leading the development of the DARP, which will serve as the foundation of the OPA claim to compensate the public for injured natural resources and lost services. Consistent with OPA regulations, restoration planning processes are subject to NEPA, and NOAA is leading the development of a PEIS in conjunction with the draft DARP release. The scope of restoration planning, including development of these documents, requires a substantial effort to ensure that a thorough, detailed presentation of injury information and all proposed restoration planning actions are carefully linked.

OPA Analysis

NOAA will use funds from this Claim to evaluate restoration alternatives, select a preferred restoration alternative(s), and document OPA analysis and decisions in a draft DARP. A NOAA-led management team called the Restoration Planning Team (RPT) will oversee the development, analysis, and selection of restoration alternatives for inclusion in the DARP. Funds from this IPC will support the evaluation and selection of restoration alternatives and documentation of these processes and analyses. As required by the OPA regulations, the Trustees must develop and evaluate a reasonable range of restoration alternatives before identifying their preferred alternative(s). Each restoration alternative is comprised of restoration components that must address one or more specific injury(ies) associated with the Incident. An alternative must be designed so that, as a package of one or more actions, the alternative would make the environment and public whole. NOAA's work through the RPT and resource-specific sub-teams will provide the rigorous, quantitatively supported analysis necessary to demonstrate why this package of actions is preferred in comparison to other restoration actions developed and fully considered.

NOAA will lead the process of compiling and writing analyses and descriptions of OPA decisions in the form of a draft DARP and its supporting documents, including appendices and other reports. NOAA will develop a draft DARP in accordance with OPA regulations, which require an opportunity for public review and comment. This process will require a significant effort to synthesize the results of various case injury assessment and restoration planning activities and to validate written documentation of decisions with Trustee decision-makers, including legal counsel review.

NOAA's leadership role via the RPT must account for the dynamic nature of the restoration planning for this Incident. For example, as restoration is accelerated via Early Restoration, each successive Early Restoration plan must be accounted for in the ongoing work on the draft DARP and PEIS. Similarly, as injury determination and quantification studies draw to a close, these data are integrated into the DARP planning efforts to refine the restoration approaches and their appropriate scale. Therefore, Early Restoration and injury assessment have significant influence on the timing and development of the draft DARP and PEIS.

NEPA Analysis

NOAA continues to lead development of the draft PEIS, and funds provided through this Claim will support the completion of draft NEPA analysis for restoration actions described in the draft DARP. The PEIS must evaluate the reasonable range of alternatives that meet the purpose and need for restoration planning (discussed above), and provide the basis for a meaningful comparison of alternatives with

respect to their environmental consequences. The PEIS will consider the direct, indirect, and cumulative impacts of the preferred restoration action and alternatives, and will explore options for mitigating adverse effects associated with restoration actions.

Since the PEIS will analyze and compare the impacts of restoration alternatives developed through the OPA restoration planning process, development of the PEIS analysis and documentation will continue throughout the OPA restoration planning process. Drafting of the PEIS, in coordination with the Trustees and additional cooperating agencies, will be a combination of Agency and contractor staff and contract supported efforts.

The draft DARP and PEIS will undergo internal NOAA, Trustee, and cooperating agency review. This will require subsequent adjudication of Trustee and agency comments in preparation for public review of the documents. Considerable effort from other NOAA line offices, including Agency and contract labor, will be utilized for development, review, and revision of the documents to ensure they are technically sufficient and accurately analyze the restoration alternatives.

Public review of the draft DARP and PEIS will consist of public meetings, which require coordinated planning in advance of the document release. Public meeting planning costs, including securing meeting venues, equipment rentals, and other associated costs, are listed below in the “other requirements” section.

Regulatory Compliance

The DARP must consider and appropriately comply with multiple environmental statutes including but not limited to Section 7 of the Endangered Species Act and the Essential Fish Habitat provisions of the *Magnuson-Stevens* Fishery Conservation and Management Act. Coordination with regulatory agencies to determine the set of compliance needs associated with the DARP will be undertaken to ensure all necessary compliance is initiated at the appropriate times in DARP development. Integration of regulatory and environmental compliance efforts will be critical to consider in describing, analyzing, scaling and costing preferred actions. These compliance efforts also inform the potential environmental consequences of actions and are important to assessing impacts to protected resources in the draft PEIS.

Level of Effort

A total of \$12,786,300 is projected for the DARP, PEIS, and Associated Environmental Compliance, which includes 16.2 agency FTEs and 29.4 contractor equivalents.

Other requirements for this effort: DARP and PEIS contract support includes the following:

- Contracts associated with DARP and PEIS printing, distribution, translation, and similar services. (\$40,000).
- Upfront planning costs for 12 (11 Gulf/1 DC) public meeting facility rentals, A/V equipment rentals, security, translators, court reporter, advertisements, and associated costs (\$390,000).

Total required for Damage Assessment and Restoration Plan (DARP), Programmatic Environmental Impact Statement (PEIS), and Associated Regulatory Compliance: \$13,216,300

Data Management

As with Assessment data management, NOAA plays a unique corporate role in overall support of the Trustee Council. Funds from this Claim will be used to provide support to Trustee system users and to maintain existing systems via contract. A Restoration Planning DMT continues to support the information management needs of the DWH Trustee Council Restoration Planning teams through a variety of data management approaches, systems, and tools. These efforts require dedicated time of NOAA staff to coordinate with a number of Trustees as well as Information Technology staff to fully support execution of business rules, workflows, and protocols, and to manage systems and tools. NOAA's DMT will continue supporting the Trustee Council's restoration planning data management needs and will actively work to integrate Trustee data into existing tools.

Through a DWH SharePoint site, NOAA's DMT also supports Trustee document management and collaboration and facilitates NOAA's submission of appropriate records to the case administrative record. NOAA's DMT interacts with IT staff to ensure the site is configured according to evolving requirements, that user accounts and access are managed appropriately, and that the infrastructure and software maintenance issues are addressed.

NOAA's DMT continues to maintain and manage a project idea database on behalf of the Trustees to collect and analyze the public's restoration project suggestions. The team maintains coordination with other Trustees to provide periodic data exports of all suggested projects and maintains a web-based interactive project atlas that allows the public to view project information. The team provides technical support to the public to assist with submitting project ideas through the online database or with viewing the project information on the website.

Level of Effort

A total of \$477,900 is projected for this requirement, which includes 0.4 agency FTEs and 1.4 contractor equivalents.

Other requirements for this effort: Data management contract support includes the following:

- The Trustees rely on the project database to facilitate a variety of management processes and requirements for OPA restoration planning. Funding will be needed to support system management and maintenance of existing capabilities. (\$100,000)
- Document management and information needs of the DWH Restoration Planning case teams are supported through the use of a Microsoft SharePoint site. Contracted services are needed to provide system maintenance as well as to cover software licensing and infrastructure costs associated with improving and expanding capacity to support growing document load and user activity. (\$50,000)
- The public submits project ideas on an ongoing basis and may update their previously submitted ideas at any time. Project idea collection and consideration are anticipated to continue into the future; thus, NOAA must maintain existing data management systems that support project submission capabilities provided to the Trustees and the public. Contracted services are needed to provide infrastructure and software maintenance support for the data system used for ongoing restoration project idea collection and management. (\$20,000)

Total requirement for Data Management: \$647,900

Communications

As the Trustees approach the public release of the draft DARP, PEIS, and other supporting documents, NOAA will increase its communications planning and execution efforts to ensure the public understands basic processes, timelines, and tools for commenting on the draft documents. The NOAA Gulf Spill Restoration website (www.gulfspillrestoration.noaa.gov), social media channels and list-serves the communications team manages are critical to this effort. The website is the centerpiece of this effort, as it provides the avenues for the public to submit restoration project ideas; view/map all projects submitted for consideration; review and comment on the restoration planning documents; and explore the natural resource injuries that drive restoration planning decisions. This platform has been embraced by the Trustees as the central repository for materials, an invaluable function, and houses a restoration project tracking database critical to providing public transparency during project implementation. Attachment A-8 includes a subset of documents that can be found on this website.

Level of Effort

A total of \$217,200 is required for this requirement, which includes 0.3 agency FTEs and 0.4 contractor equivalents.

Other requirements for this effort: Communications contract support includes the following:

- Facilitated outreach to expand efforts to comply with Environmental Justice requirements. Contractor support will engage under-represented communities and support efforts for participation in the public process. This includes education on how to provide input effectively (\$225,000)
- Photography services for website and other outreach products (\$20,000)

Total requirement for Communications: \$462,200

Activity 22: Total Costs and Level of Effort for the Restoration Planning Activity

Our request for the restoration planning activity is \$16,412,700, including \$9,067,900 in contract funds and \$7,344,800 in agency funds. The request includes 33.1 contract equivalents and 20.9 agency FTEs. Please refer Attachment A-6 for a detailed breakdown of costs.

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¹⁰ See Attachment A-9 for selected PDFs of peer-reviewed manuscripts.

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ATTACHMENTS