DRAFT
DAMAGE ASSESSMENT AND RESTORATION PLAN
AND
ENVIRONMENTAL ASSESSMENT

MISSISSIPPI RIVER OIL SPILL
GRETNA – NEW ORLEANS, LOUISIANA
JULY 23, 2008

NRDA Case File# LA2008_0723_0230 (Gretna/MS River 2008)

Prepared by:

Louisiana Oil Spill Coordinator's Office
Louisiana Department of Environmental Quality
Louisiana Department of Natural Resources
Louisiana Department of Wildlife and Fisheries
Coastal Protection and Restoration Authority of Louisiana
United States Department of the Interior, United States Fish and Wildlife Service
National Oceanic and Atmospheric Administration

May 2021

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EXECUTIVE SUMMARY

On July 23, 2008, the M/T Tintomara collided with Barge DM932 controlled by the UTV Mel Oliver at River Mile Marker (RMM) 98 on the Mississippi River near New Orleans, Louisiana (herein referred to as the "Incident"). Barge DM932 was carrying 9,983 barrels (419,286 gallons) of No. 6 fuel oil within three tanks. After the accident, approximately 3,250 barrels (136,500 gallons) of oil were recovered from one tank that had not been ruptured by the collision. Until lightering was completed, oil was occasionally released from the sunken Barge DM932 over a two-week period prior to and during salvage. Overall, an estimated 6,734 barrels (282,828 gallons) of oil were released into the waters of the Mississippi River. The release lasted until August 10, 2008, when final salvage efforts were completed. American Commercial Barge Line LLC (ACL) was identified as the Responsible Party for the Incident.

Spilled oil from the Incident spread more than 100 miles downriver and affected over 5,000 acres of shoreline habitat. Aquatic and shoreline habitats within the batture (land between the river and its levee, which consists of, forested wetlands, scrub-shrub habitat, mud flats, and freshwater marsh) were oiled, as were birds, mammals, reptiles, and other wildlife.

The United States Coast Guard (USCG) directed Incident response. As part of the response, the USCG closed the Mississippi River from RMM 98 to the Southwest Pass Sea Buoy (near the Gulf of Mexico) from July 23 until July 29, 2008. Response actions included lightering and recovering Barge DM932, deployment of hard and absorbent boom, wildlife surveys and hazing, and capture and rehabilitation of oiled wildlife.

This Draft Damage Assessment and Restoration Plan and Environmental Assessment (DARP/EA) was prepared by the Louisiana Oil Spill Coordinator's Office, Department of Public Safety (LOSCO); the Louisiana Department of Environmental Quality (LDEQ); the Louisiana Department of Natural Resources (LDNR); the Louisiana Department of Wildlife and Fisheries (LDWF); the Coastal Protection and Restoration Authority (CPRA); the United States Department of the Interior (DOI), represented by the United States Fish and Wildlife Service (FWS); and the United States Department of Commerce, represented by the National Oceanic and Atmospheric Administration (NOAA); collectively acting as Trustees for the restoration of natural resources, their services, and public use services that were exposed to and/or injured as a result of the Incident. This Draft DARP/EA is issued to inform the public concerning the Trustees' authorities and responsibilities under the Oil Pollution Act of 1990 (OPA) (33 United States Code [U.S.C.] § 2701 et seq.), the Louisiana Oil Spill Prevention and Response Act of 1991 (OSPRA) (Louisiana Revised Statutes [R.S.] 30:2451 et seq.), and the National Environmental Policy Act (NEPA) (83 Stat. 852; 42 U.S.C. § 4321 et seq.); and to allow the Trustees to solicit and consider public comment on proposed alternatives to restore resources injured by the Incident. In this Draft DARP/EA, the Trustees evaluate potential restoration alternatives which exhibit sufficient nexus to the natural resources injured by the Incident and would provide resource services to compensate the public for natural resource losses resulting from the discharged oil. The Trustees propose a preferred restoration alternative for implementation that includes multiple projects that provide restoration of natural resources commensurate with injuries to forested wetlands, emergent wetlands, fisheries habitat, and natural resource use by the general public. The Trustees' proposed preferred restoration

alternative was developed as part of the Natural Resource Damage Assessment (NRDA) process through negotiations with ACL on a potential settlement of natural resource damage claims. Implementation of the preferred alternative is contingent upon future court approval of a settlement agreement between the Trustees and ACL, which would be subject to public notice and comment.

This Draft DARP/EA provides information on:

- the Incident, spill response, restoration to pre-spill baseline conditions, and legal authorities (Chapter 1);
- the natural resources found in the area affected by the Incident (Chapter 2);
- the nature and extent of the natural resources exposed and/or injured and the lost public uses resulting from the Incident (Chapter 3);
- the range of potential restoration alternatives identified by the Trustees under OPA and National Environmental Policy Act (NEPA) to restore the natural resources and resource services injured by the Incident and the identification of the Trustees' proposed preferred restoration alternative (Chapter 4); and
- the analysis of potential environmental consequences of the restoration alternatives considered by the Trustees (Chapter 5).

The EA portion of this document is being prepared using the 1978 Council on Environmental Quality (CEQ) NEPA Regulations. NEPA reviews initiated prior to the effective date of the revised CEQ regulations may be conducted using the 1978 version of the regulations. The effective date of the 2020 CEQ NEPA Regulations was September 14, 2020. Under 40 C.F.R. §§ 1501.5 and 1501.6, for the purposes of this NEPA analysis, DOI is the lead agency and NOAA is a cooperating agency. NOAA may adopt the Final EA, as appropriate, in accordance with 40 CFR § 1506.3 and its agency-specific NEPA procedures. This review began on September 20, 2016 when the Trustees issued the Notice of Intent to Conduct Restoration Planning for the NRDA; DOI and NOAA decided to proceed under the 1978 regulations.

ABBREVIATIONS

ACL	American Commercial Barge Line LLC
AR	Administrative Record
BLH	Bottomland Hardwood
CEQ	Council on Environmental Quality
C.F.R.	Code of Federal Regulations
CPRA	Coastal Protection and Restoration Authority
DARP	Damage Assessment and Restoration Plan
DNWR	Delta National Wildlife Refuge
DOI	United States Department of the Interior
DSAYs	Discounted Service Acre Years
EA	Environmental Assessment
EFH	Essential Fish Habitat
EIS	Environmental Impact Statement
FWS	United States Fish and Wildlife Service
GIS	Geographic Information System
HDDA	Hopper Dredge Disposal Area
HEA	Habitat Equivalency Analysis
LAC	Louisiana Administrative Code
R.S.	Louisiana Revised Statute
LDEQ	Louisiana Department of Environmental Quality
LDNR	Louisiana Department of Natural Resources
LDWF	Louisiana Department of Wildlife and Fisheries
LOSCO	Louisiana Oil Spill Coordinator's Office, Department of Public Safety and Corrections
LCWCRTF	Louisiana Coastal Wetlands Conservation and Restoration Task Force
MRFSS	Marine Recreational Fisheries Statistical Survey
NEPA	National Environmental Policy Act
NOAA	National Oceanic and Atmospheric Administration
NRDA	Natural Resource Damage Assessment
OPA	Oil Pollution Act
OSPRA	Oil Spill Prevention and Response Act
REA	Resource Equivalency Analysis
RMM	River Mile Marker
RRP Program	Regional Restoration Planning Program
SCAT	Shoreline Clean-up and Assessment Technique
U.S.	United States
USACE	United States Army Corps of Engineers, Mississippi River Valley New Orleans Division
U.S.C.	United States Code
USCG	United States Coast Guard

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1 INTRODUCTION

1.1 Purpose and Need for Restoration

On July 23, 2008, Barge DM932 owned and operated by American Commercial Barge Line, LLC (ACL) was struck broadside by the M/V Tintomara on the Mississippi River at River Mile Marker (RMM) 98 near New Orleans, Louisiana. The collision compromised the internal compartment of the barge, causing it to discharge a significant amount of No. 6 fuel oil into the Mississippi River (herein referred to as the "Incident"). Natural resources within and adjacent to the Mississippi River were injured from exposure to oil as a result of the Incident. Public services provided by these natural resources were also injured. The natural resource trustees for the Incident (Trustees; see below) prepared this Draft Damage Assessment and Restoration Plan and Environmental Assessment (DARP/EA) to inform the public about natural resource injuries caused by the Incident; potential restoration alternatives considered to compensate the public for those injuries; and projects the Trustees propose as the "Preferred Alternative" to accomplish the goal of restoring, rehabilitating, replacing and/or acquiring the equivalent of those resources and the services they provide.

This document is part of the Natural Resource Damage Assessment (NRDA) process being performed pursuant to the Oil Pollution Act of 1990 (OPA) and the Louisiana Oil Spill Prevention and Response Act of 1991 (OSPRA) by the Louisiana Oil Spill Coordinator's Office, Department of Public Safety (LOSCO); the Louisiana Department of Environmental Quality (LDEQ); the Louisiana Department of Natural Resources (LDNR); the Louisiana Department of Wildlife and Fisheries (LDWF); the Coastal Protection and Restoration Authority (CPRA); the U.S. Department of the Interior (DOI), represented by the United States Fish and Wildlife Service (FWS); and the U.S. Department of Commerce, represented by the National Oceanic and Atmospheric Administration (NOAA); collectively known as the Trustees. The purpose of the Trustees' proposed restoration actions, as outlined in this Draft DARP/EA, is to make the public whole for injuries to natural resources and their services resulting from the Incident by returning the injured natural resources and related services to their "baseline" condition (i.e., the condition that would have occurred but for the Incident) and compensating the public for associated interim losses. This Draft DARP/EA also serves as an Environmental Assessment to meet requirements of the National Environmental Policy Act (NEPA) by evaluating the reasonably foreseeable impacts of the preferred restoration actions on the quality of the physical, biological, and cultural environment in the Mississippi River watershed.

This Draft DARP/EA presents information about the affected environment (Chapter 2), the Trustees' estimates of exposure and/or injury and service losses to natural resources caused by the Incident (Chapter 3), the potential restoration alternatives and the proposed selection of the Trustees' preferred restoration alternative (Chapter 4), and an analysis of the potential environmental consequences of those potential alternatives (Chapter 5). The Trustees seek comments on the restoration alternatives evaluated in this Draft DARP/EA, including the Trustees' proposed preferred restoration alternative. The Trustees will consider these comments in development of the Final DARP/EA.

ACL has been identified as the Responsible Party for the Incident under OPA and OSPRA. As part of the NRDA process, the Trustees reached agreement on a potential settlement of natural resource damage claims with ACL. The terms of the proposed settlement are subject to public notice and comment, following lodging of a proposed consent decree with the United States District Court, and any settlement is subject to approval by the United States District Court. Accordingly, implementation of the restoration projects identified by the Trustees as the preferred restoration alternative in this Draft DARP/EA is contingent upon future court approval of a settlement agreement between the Trustees and ACL, which would only occur following public notice and comment. Additionally, implementation would occur as described in a court-approved consent decree.

1.2 Summary of the Incident

On July 23, 2008, the M/T Tintomara collided with Barge DM932 controlled by the UTV Mel Oliver at approximately RMM 98 on the Mississippi River near New Orleans, Louisiana (Figure 1.1). Barge DM932 was carrying 9,983 barrels (419,286 gallons) of No. 6 fuel oil within three tanks. After the accident, approximately 3,250 barrels (136,500 gallons) of oil were recovered from one tank that had not been ruptured by the collision. Until lightering was completed, oil was discharged from the sunken barge over a two-week period, prior to and during salvage. Overall, an estimated 6,734 barrels (282,828 gallons) of oil were discharged into the waters of the Mississippi River. The discharge lasted until August 10, 2008, when final salvage efforts were completed. Due to a high-water event that created swift current conditions in the river at the time of the discharge, the oil spread more than 100 miles downriver and affected over 5,000 acres of batture and riverine shoreline.

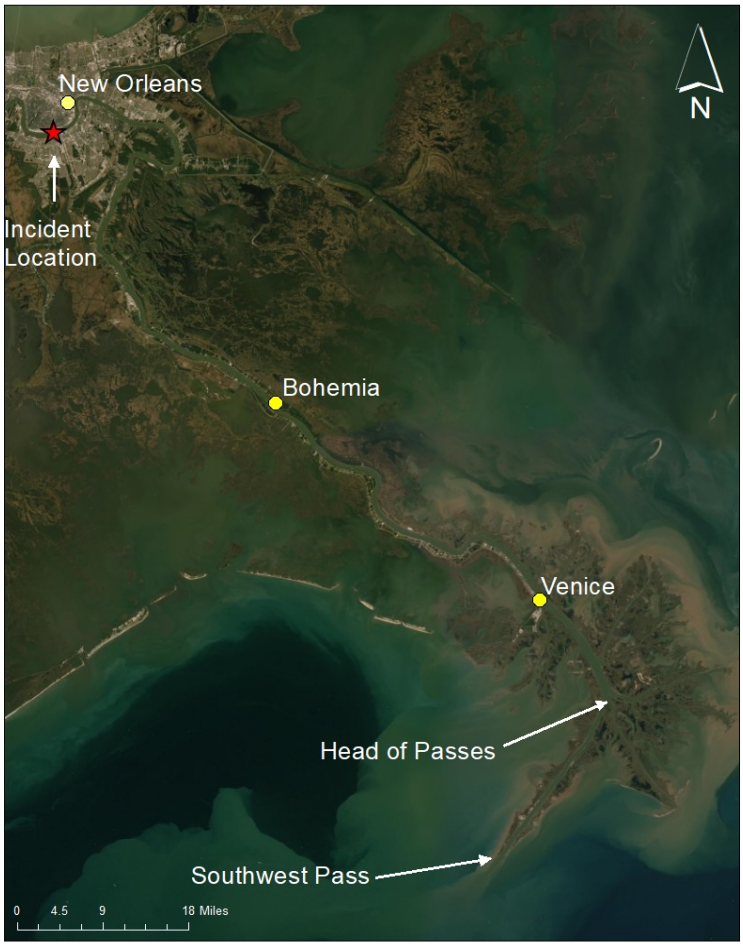

Figure 1.1. Barge DM932 Incident location along the Mississippi River.

Number 6 fuel oil is nearly the same density as water, and discharged oil was observed floating throughout the Incident area. By day two of the Incident, aerial reconnaissance surveys revealed sheens and tar patties at Head of Passes, as well as in the marsh areas located adjacent to breaks in the riverbank. As the water receded, oil became stranded in the batture, especially on and in

crevices within riprap and along the shoreline (Figure 1.2 A-F). Response personnel discovered later that oil had also sunk to the river bottom near Head of Passes. Observations made during barge salvage operations suggested that some of the oil also sank, mixed with suspended sediment, and then resurfaced downstream when entrained in turbulence. The result was patchy surface oiling throughout the Incident area, with unknown amounts or effects of submerged oil.

As a result of the Incident, Mississippi River surface waters, shoreline habitats, fauna inhabiting these areas, and river sediments were exposed to the discharged No. 6 fuel oil. State and Federal Trustee agency personnel and ACL representatives responded to the Incident as part of the Unified Command (see Section 1.3) and observed potential injury to habitat and other biological resources, as well as effects on recreational activities.

During the Incident, the United States Army Corps of Engineers (USACE) was conducting unrelated regular maintenance dredging operations for navigational purposes in the Mississippi River at Southwest Pass (Figures 1.1 and 1.3). On July 28, 2008, two hopper dredges conducting those operations were ordered to cease activities when they encountered oil, oil sheen, and droplets of oil in the hopper section of the dredge. The USACE was also dredging at the Hopper Dredge Disposal Area (HDDA) nearby as part of a sediment mining project to create emergent marsh within the Delta National Wildlife Refuge (DNWR) (Figure 1.3). Concurrent with suspending the hopper dredge work, the USACE suspended the sediment mining work at the HDDA because of the potential for placing oil contaminated dredged material into the DNWR. The USACE, United States Coast Guard (USCG), NOAA Scientific Support, FWS, and State trustee agencies developed a phased dredging plan, which allowed necessary dredging operations to resume based on identified procedures and alternative disposal areas (Disposal Sites A and B), and which would be implemented should oil contamination of dredged material recur (Figure 1.3). However, a significant amount of dredge material that otherwise would have been used in unrelated restoration projects ongoing at the time was lost due to contamination and/or alternative placement.

Figure 1.2. Photos depicting various observed impacts as a result of the Incident. A) Mississippi River facing downstream from the French Quarter in New Orleans, LA (July 23, 2008). B) Riverwalk area in New Orleans, LA (July 24, 2008). C) A typical clean-up crew working in the batture (July 24, 2008). D) Typical affected riprap. E) Heavily oiled batture, including silver sheen and black streamers, south of the Incident location (July 25, 2008). F) Stranded oil in the batture (August 1, 2008).

1.3 Summary of Response Actions

Federal and State Trustee agencies, as well as ACL and its Oil Spill Response Operators, began responding to the oil discharges from Barge DM932 on July 24, 2008. The USCG assumed leadership of the Unified Command in its role as Federal On-scene Coordinator. The Unified Command included representatives from ACL, FWS, NOAA, LDEQ, LOSCO, and LDWF. The USCG closed the Mississippi River from RMM 98 to the Southwest Pass Sea Buoy (near the Gulf of Mexico) from July 23, 2008, until July 29, 2008. Restrictions on speed and travel in some areas of the river continued after this time during barge salvage operations. On July 25, 2008, the FWS initiated aerial reconnaissance to determine the extent of oil discharged downriver, and Wildlife Rehabilitation and Education (Huston, TX) set up rehabilitation facilities for oiled wildlife in Venice, Louisiana. By the afternoon of July 25, 2008, there were numerous reports and confirmed sightings of oiled wildlife in New Orleans and downstream on the Mississippi River. To facilitate reporting, a hotline for the public to report oiled wildlife observations was activated on July 26, 2008. From July 30 until August 19, 2008, the U.S. Department of Agriculture's Wildlife Services helped with wildlife capture and was instrumental in evaluating and ameliorating oil impacts on wildlife.

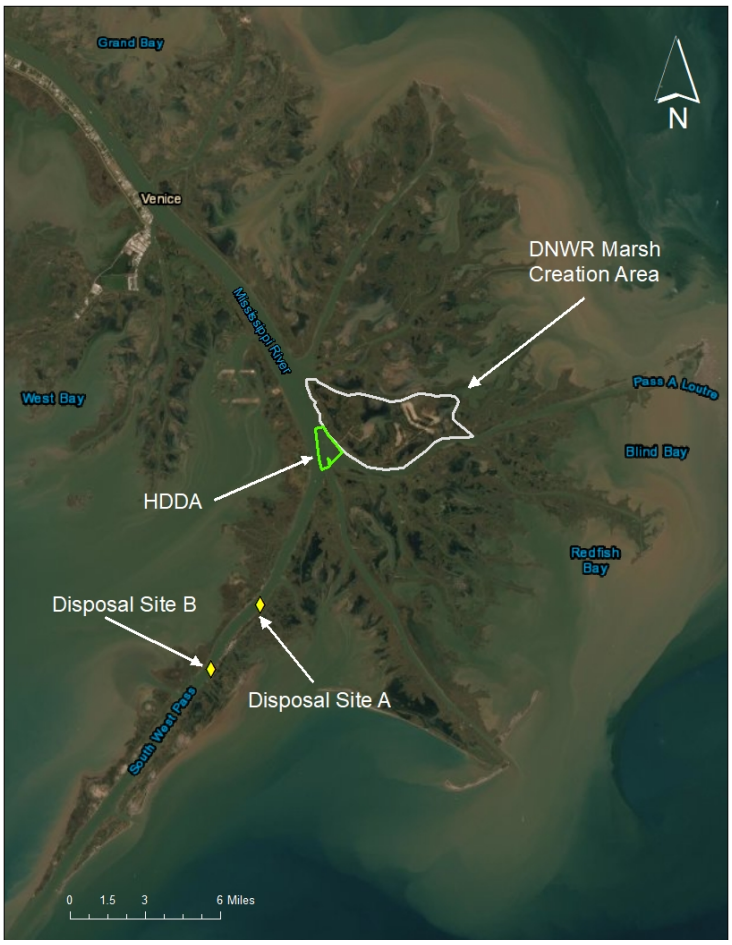

Figure 1.3. Various locations associated with the USACEs' maintenance dredging operations along the Mississippi River and within the Bird's Foot Delta.

Response actions included lightering and recovering Barge DM932 and deployment of hard and absorbent boom. Oil skimmers were deployed to recover accessible oil on the surface. Wildlife response personnel initiated wildlife surveys, hazing, and capture and rehabilitation of oiled wildlife. Shoreline and batture areas were cleaned using sorbents, sometimes preceded by water flushing and/or removal of oiled soil. Most of the oiled shoreline and batture areas were cleaned manually. Vessels moored along the river and exposed to oil were also decontaminated.

Air monitoring was conducted early during the Incident and downstream drinking water intakes were closed to protect human health. By July 30, 2008, all drinking water intakes below RMM

97 were reopened, but advisories were published for intakes at critical points during the barge salvage operation period, a period that ended on August 10, 2008.

After August 10, 2008, no significant oiling was observed in open water in the river. Response efforts subsequently concentrated within impacted batture and shoreline habitats. By August 19, 2008, approximately 130 miles of shoreline (65 percent of the potentially impacted area) had been cleaned or recommended for no further response action. Residual oil on areas of riprap remained the most challenging for response operations to recover because no cleaning methods were effective at removing pooled oil from within rock crevices. An organic material was used to coat the remaining pooled oil within riprap to reduce the threat of physical contact to wildlife.

On August 27, 2008, response operations were temporarily suspended due to the impending passage of Hurricane Gustav on September 1, 2008. At that time, two affected areas remained under active investigation by response personnel: (1) heavily oiled riprap along a segment of the lower Mississippi River, and (2) heavily oiled riprap adjacent to the Riverfront in downtown New Orleans. By September 25, 2008, crews renewed response actions in those areas. On October 29, 2008, all response operations were complete. Overall, response activities resulted in the recovery of approximately 3,250 barrels (136,500 gallons) of oil from the barge, recovery of approximately 3,000 bbls (126,000 gallons) of discharged oil from the environment, activation of 2,300 responders and 200 response boats, the cleaning of 1,185 vessels, and deployment of 130,000 linear feet of boom.

1.4 NRDA Authority and Legal Requirements

The federal Trustees for this Incident (FWS and NOAA) were designated pursuant to the National Contingency Plan (NCP) (40 C.F.R. §300.600) and Section 1006(b) of OPA (42 U.S.C. §2706(b)). State Trustees for Louisiana are designated by the Governor of Louisiana pursuant to the NCP (40 C.F.R. §300.605) and OSPRA (R.S. 30:2451 et seq.), and include LOSCO, LDEQ, LDNR, LDWF, and CPRA. Each designated Trustee is authorized to act on behalf of the public to assess and recover natural resources and resource services injured or lost as the result of a discharge or discharges of oil.

1.4.1 Overview of Legal Requirements

The NRDA process conducted pursuant to OPA, and the regulations promulgated thereunder at 15 C.F.R. Part 990 and OSPRA (R.S. 30:2451 et seq.), consists of three phases: (1) Preassessment, (2) Restoration Planning, and (3) Restoration Implementation. OPA authorizes federal, state, and tribal natural resource trustees to initiate a damage assessment when natural resources may have been injured and/or natural resource services impaired as a result of, or a substantial threat of, a discharge of oil. OPA regulations provide specific definitions for the following terms:

- "Injury" is "an observable or measurable adverse change in a natural resource or impairment of a natural resource service";
- "Natural resources" are "land, fish, wildlife, biota, air, ground water, drinking water supplies, and other such resources belonging to, managed by, held in trust by,

appertaining to, or otherwise controlled by the United States, any state or local government, or Indian tribe"; and

- "Natural resource services" are "functions performed by a natural resource for the benefit of another resource and/or the public."

During the Preassessment Phase, the Trustees determined that the provisions and determinations of OPA and OSPRA applied to the Incident, including: (1) one or more incidents had occurred, (2) the discharge was not from a public vessel, (3) the discharge was not from an onshore facility subject to the Trans-Alaska Authority Act, (4) the discharge was not permitted under federal, state, or local law, and (5) public trust natural resources and/or services may have been injured as a result of the discharge. On the basis of those determinations, on September 20, 2016, the Trustees issued the Notice of Intent to Conduct Restoration Planning for the NRDA case associated with the Incident. The Trustees began the Restoration Planning Phase even as they were still finishing some Preassessment activities. In the Restoration Planning Phase, the Trustees evaluated and quantified the nature and extent of injuries to natural resources and services, and determined the need for, type of, and scale of appropriate restoration actions. Using the information developed during the Restoration Planning Phase, the Trustees developed this Draft DARP/EA for public comment.

The first component of the Restoration Planning Phase was injury assessment. The Trustees evaluated injury to: (1) shoreline habitats, including forested and emergent wetlands and riprap, (2) aquatic fauna, (3) lost use of dredged sediments for restoration projects, (4) birds, and (5) public recreational uses, including fishing and riverfront use. As provided at 15 C.F.R. § 990.14(c)(1), the Trustees invited ACL to participate in the injury assessment component of the NRDA (see also Section 1.4.3).

The second component of the Restoration Planning Phase is restoration selection (also known herein as the Trustees' restoration planning process). Considering the nature and extent of exposure and/or injuries to natural resources caused by the Incident, the Trustees developed a plan for restoring the injured resources and services, which is set forth in this Draft DARP/EA. The Trustees identified reasonable restoration alternatives and evaluated those alternatives to determine the preferred restoration actions from among them. As a part of this process, the Trustees considered the extent to which the potential restoration alternatives provide benefits to more than one natural resource and/or service, as well as the cost-effectiveness of the alternatives. The Trustees are now seeking public comments on this Draft DARP/EA. Any funds recovered in settlement of natural resource damage claims, other than reimbursement of Trustee costs, would be expended in accordance with the Final DARP/EA.

Natural resource Trustees may settle claims for natural resource damages under OPA at any time during the damage assessment process, provided that the settlement is: (1) adequate in the judgment of the Trustees to satisfy the goals of OPA, and (2) fair, reasonable, and in the public interest, with particular consideration of the adequacy of the settlement to restore, replace, rehabilitate, or acquire the equivalent of the injured natural resources and services.

1.4.2 National Environmental Policy Act Compliance

Any restoration of natural resources under OPA must comply with NEPA, as amended (42 U.S.C. § 4321 et seq.), and its implementing regulations (40 C.F.R. § 1500-1508) where federal actions may significantly impact the human environment. In compliance with NEPA and its regulations, this Draft DARP/EA identifies potential restoration alternatives, describes the purpose and need for the action, evaluates reasonably foreseeable environmental consequences, and provides for public participation in the decision-making process. The information on environmental consequences will be used in making a threshold determination as to whether preparation of an Environmental Impact Statement (EIS) is required prior to the selection of the Trustees' preferred restoration actions. If an EIS is not warranted, a Final DARP/EA will be published after consideration of public comment.

For certain preferred restoration actions (e.g., recreational use restoration proposed herein), project-specific NEPA analysis may be needed as the plans for these restoration actions become more concrete. For example, the Trustees could in the future conduct a consistency analysis to determine whether the anticipated environmental impacts of the specific projects proposed for implementation fall within the range of impacts evaluated in the DARP/EA. If so, a consistency determination could be made and no further NEPA review would be necessary to implement the projects. If the anticipated impacts fall outside of the scope of those evaluated in the DARP/EA, however, the Trustees could choose not to proceed with the specific projects, or choose to conduct the follow- up NEPA analysis necessary to select projects for implementation. Similarly, if there is a significant change to any of the restoration projects originally selected in the Final DARP/EA, the Trustees would consider the need to develop a restoration plan amendment and/or additional environmental analyses in accordance with NEPA regulations, which typically require a supplemental NEPA analysis be prepared if new information arises that would substantively impact previous decision-making or if there is a substantial change to a selected restoration project (40 C.F.R §1502(9)(d)). Project changes not deemed significant could be outlined in a supplemental information report, or similar type document, for posting to the Administrative Record.

The EA portion of this document is being prepared using the 1978 CEQ NEPA Regulations. NEPA reviews initiated prior to the effective date of the revised CEQ regulations may be conducted using the 1978 version of the regulations. The effective date of the 2020 CEQ NEPA Regulations was September 14, 2020. Under 40 C.F.R. §§ 1501.5 and 1501.6, for the purposes of this NEPA analysis, DOI is the lead agency and NOAA is a cooperating agency. NOAA may adopt the Final EA, as appropriate, in accordance with 40 CFR § 1506.3 and its agency-specific NEPA procedures. This review began on September 20, 2016 when the Trustees issued the Notice of Intent to Conduct Restoration Planning for the NRDA; DOI and NOAA decided to proceed under the 1978 regulations.

1.4.3 Coordination with Responsible Party

The OPA and the OSPRA regulations for NRDA (15 C.F.R. Part 990 and OSPRA at LAC 43:XXIX.101 et seq.) require the Trustees to invite the responsible party to participate in the damage assessment process. Accordingly, on August 6, 2008, the Trustees invited ACL to

participate in the damage assessment process for this Incident. ACL formally accepted the Trustee's invitation on August 12, 2008. Prior to this time, the Trustees and ACL were already working together cooperatively to collect field data for Preassessment and injury assessment analyses. On January 16, 2009, the Trustees and ACL signed a Cooperative Agreement for conducting a NRDA for the Incident. This Cooperative Agreement addressed the Trustees' and ACL's desire to expedite the Preassessment data collection process by using resource-specific protective assumptions for shoreline impacts. ACL was therefore involved in the design, performance, and funding of several Preassessment activities to collect ephemeral data. Information collected by all parties was shared, as were the results of analyses undertaken independently by the Trustees and ACL. This coordination reduced duplication of effort, increased the cost-effectiveness of the assessment process, and increased sharing of information. The Trustees' assessment used data produced by the Trustees, ACL (when validated), and other sources.

While proceeding with the injury assessment for the Incident, the Trustees also participated in settlement negotiations with ACL. Doing so is consistent with the OPA regulations, which are intended, in part, to facilitate settlement of damage claims without litigation. As required by the regulations at 15 C.F.R. §990.14 (c)(4), the Trustees retain final authority to make determinations regarding injury and restoration.

1.4.4 Public Participation

On September 20, 2016, the Trustees published a Notice of Intent to conduct restoration planning in the Louisiana Register (Vol. 42, No. 09, pgs. 1572-1573, September 20, 2016); *The Times Picayune*, New Orleans, LA; and *The Advocate*, Baton Rouge, LA, and New Orleans, LA. The Notice of Intent stated that, based on Preassessment findings, the Trustees were proceeding with restoration planning following OPA and OSPRA regulations and opening an Administrative Record to facilitate public involvement in the restoration planning process (see section 1.4.5).

This Draft DARP/EA provides information about the nature and extent of natural resource injuries resulting from the Incident and identifies preferred restoration actions to address those injured resources. Public review of the Draft DARP/EA is an integral component of the Restoration Planning Phase. Public comment is consistent with all federal and state laws and regulations that apply to the natural resource damage assessment and restoration process, including Section 1006 of OPA, the NRDA regulations at 15 C.F.R. Part 990, Section 2480 of OSPRA, the OSPRA regulations at LAC 43:XXIX.101 *et seq*., and NEPA, as well as associated implementing regulations.

This Draft DARP/EA is available to the public for a 30-day comment period, which will begin on the date of the public notice announcing its availability. After the public comment period has ended, all comments received will be evaluated by the Trustees. All significant comments will be summarized and responded to in the Final DARP/EA. An additional opportunity for public review will be provided in the event that the Trustees decide to make significant changes to the Draft DARP/EA based on the initial public comments.

Comments on this Draft DARP/EA should be emailed or postmarked by the end of the 30-day comment period and sent to:

Louisiana Oil Spill Coordinator's Office
Department of Public Safety & Corrections
Attn: Charles K. Armbruster
P.O. Box 66614
Baton Rouge, LA 70896
charles.armbruster@la.gov
(225) 925-6606
Mon.-Fri. 8:00am to 4:30pm Central Time Zone

1.4.5 Administrative Record (AR)

The Trustees maintain records to document the information considered by the Trustees as they developed this Draft DARP/EA. Additional information and documents, including public comments received on the Draft DARP/EA, other related restoration planning documents, and the references cited in Chapter 8 are also part of the AR. These records are compiled in the AR, available to the public online at https://data.losco.org/ and at the address listed above for the Louisiana Oil Spill Coordinator's Office. This AR facilitates public participation in the assessment process and will be available for use in future administrative or judicial review of Trustee actions to the extent provided by federal or state law.

1.5 Summary of Natural Resource Injuries

The Trustees reviewed information gathered from response activities, Preassessment, and the Restoration Planning Phase to help determine potential natural resource injuries. The Trustees identified a number of resources injured by the Incident. These resources (as categorized by the Trustees for the purpose of this assessment) include shoreline habitat (i.e., batture, riprap), aquatic fauna, sediment for restoration projects, birds, and recreational uses (i.e., fishing and riverfront use). The Trustees used past experience from similar injury analyses and expertise of local agency personnel and habitat experts to derive the recovery time to baseline service flows and complete injury estimates. Table 1.1 provides a summary of the natural resource injuries caused by the Incident.

Table 1.1. Summary of natural resource injury estimates caused by the Incident.

Injured Resources/Services	**Injury Estimate**
Shoreline Habitats	
Batture	52.8 acres with heavy oiling 5,308.7 acres with light oiling
Riprap	11.79 acres with heavy oiling
Aquatic Fauna	32,063 kg of river shrimp biomass lost
Sediment for Restoration Projects	(a) Maintenance Dredging: 2.04 marsh acres for 15 years (b) Sediment Mining: 13.75 marsh acres for 15 years; Bayou Dupont, 493 marsh acres for 2 months
Birds	

Aquatic	540 dead birds
Terrestrial	2,896 dead birds
Human Use	
Recreational Fishing	8,369 foregone trips
Riverfront Use	11,683 total lost equivalent trips

1.6 Summary of Proposed Restoration Actions

The goal of restoration under OPA and OSPRA is to restore injured natural resources to the conditions that existed prior to the Incident and to compensate the public for interim losses. The Trustees evaluated a range of restoration actions with the potential to compensate for the natural resource and resource service losses resulting from the Incident. As indicated in Table 1.2, the Trustees propose to select restoration actions directed at habitat services, aquatic fauna, birds, and lost public use (i.e., recreational fishing and riverfront use) to compensate for those losses.

Table 1.2. Proposed restoration actions for injured resources and services associated with the Incident.

Injured Resources/Services	Proposed Restoration Actions
Shoreline Habitats	
Batture	Land acquisition and forested wetland enhancement
Riprap	
Aquatic Fauna	Marsh creation – crevasse splay
Sediment for Restoration Projects	Marsh creation – crevasse splay
Birds	
Aquatic	Marsh creation – crevasse splay
Terrestrial	Land acquisition and forested wetland enhancement
Human Use	
Recreational Fishing	Enhance public access to natural resources for recreational use
Riverfront Use	

2 AFFECTED ENVIRONMENT

This chapter provides a general description of the environment and natural resources that may be affected by restoration activities, as required by NEPA (40 C.F.R § 1502.15). The proposed restoration activities would be located in Region 2 of Louisiana's Regional Restoration Planning Program (RRP Program)[1]. Regional boundaries are described in Section 5.0 of the RRP Program Final Programmatic Environmental Impact Statement (NOAA et al. 2007). The physical environment includes the waters and sediments of the Mississippi River, its associated shoreline habitats, and emergent wetlands of the Bird's Foot Delta in Plaquemines and St. Bernard Parishes, Louisiana.

2.1 Physical Environment

The State of Louisiana is located along the north-central coast of the Gulf of Mexico. Over time, the Mississippi River has created a number of deltaic lobes along Louisiana's Gulf coast, the most recent of which is the area below New Orleans at the present mouth of the river, where the channel forks into many passages. This area is also referred to as the "Bird's Foot Delta." Between New Orleans and the Bird's Foot Delta, the Mississippi River shoreline consists of a mixture of man-made structures (e.g., industrial facilities, wharfs, docks, seawalls, borrow pits, and riprap), forested wetlands, scrub-shrub habitat, mud and sand flats, and freshwater marsh. Beyond the Mississippi River levee system, south of the greater New Orleans area, there are two hurricane protection levee systems in Plaquemines Parish (i.e., the New Orleans to Venice Hurricane Protection Levee and the Plaquemines Parish Nonfederal Hurricane Protection Levee[2]) and one hurricane protection levee system in St. Bernard Parish (i.e., part of the Lake Pontchartrain and Vicinity Hurricane Protection Levee system). The landscape surrounding the river within those hurricane protection levee systems consists of a mixture of industrial facilities, residential properties, agricultural lands, pasture, cypress swamp, bottomland hardwood (BLH) forest, and scrub-shrub habitat. Beyond the hurricane protection levee systems in Plaquemines and St. Bernard Parishes, habitats within the Barataria Basin (to the west) and Breton Sound Basin (to the east) consist of remnant cypress swamp and fresh marsh along the northernmost reaches of the basins and a mixture of fresh, intermediate, brackish, and saline marshes throughout the remaining areas. Those marshes support a productive commercial fishery and oil and gas industry and provide over-wintering habitat for migratory waterfowl and year-round habitat for a variety of mammals, birds, reptiles, and amphibians. Coastal Louisiana consists of a low elevation coastal zone experiencing some of the highest rates of relative sea level rise in the world, which contributes to significant marsh loss. Factors contributing to this trend include sea level rise and local subsidence (Keogh and Törnqvist 2019; USACE 2019).

[1] Federal and Louisiana natural resource trustees developed the statewide RRP Program to assist natural resource trustees in carrying out their NRDA responsibilities for discharges or substantial threats of discharges of oil. The goals of this statewide Louisiana RRP Program are to: 1) expedite and reduce the cost of the NRDA process; 2) provide for consistency and predictability by describing in detail the NRDA process, thereby increasing understanding of the process by the public and industry; and 3) increase restoration of lost trust resources and services. Attainment of these goals will serve to make the NRDA process as a whole more efficient in Louisiana.

[2] The New Orleans to Venice Hurricane Protection Levee and the Plaquemines Parish Non-federal Hurricane Protection Levee terminate on the left descending bank at Bohemia, Louisiana, and terminate on the right descending bank at Venice, Louisiana (Figure 1.1).

2.1.1 Climate

Situated along the northern Gulf of Mexico between 29 and 33 degrees north latitude, Louisiana's climate is humid, subtropical. The average annual temperature for southeastern Louisiana is 67 degrees Fahrenheit (°F), with mean monthly temperatures ranging from 82°F in August to 52°F in January; average annual precipitation is 57 inches (USACE 2016). During the summer months, prevailing southerly and southeasterly winds transport warm, moist air from the Gulf of Mexico across the coast. From September to May, more variable and moderate weather conditions prevail as arctic and polar air masses associated with extratropical storms periodically inundate the state and produce cooler and drier conditions. In addition to precipitation, these storms can produce significant changes in water level in the coastal bays and marshes over relatively short periods. Louisiana is also susceptible to tropical weather systems such as tropical waves, tropical depressions, tropical storms, and hurricanes. These weather systems can produce significant amounts of precipitation over a very short period and are often accompanied by strong winds, tornadoes, and storm surges along the coastal areas.

2.1.2 Regional Hydrology

The restoration actions included in the Trustees' preferred restoration alternative would be located in different areas along the Mississippi River in Plaquemines and St. Bernard Parishes, Louisiana. The Mississippi River is the largest river system in North America and is Louisiana's most important surface water resource. The Mississippi River discharges flows from approximately 41 percent of the 48 contiguous states. Discharges in the river average 470,000 cubic feet per second (cfs), and the average annual high and low discharges are 1,050,000 cfs and 161,000 cfs, respectively (Service 2003). Mississippi River stages at Venice, Louisiana, average 2.4 feet National Geodetic Vertical Datum (NGVD) with an average annual high of 5.0 feet NGVD and average annual low of 0.3-foot NGVD (Service 2003). The Mississippi River Ship Channel, Louisiana, Project authorized the enlargement of the Mississippi River to a project depth of 55 feet between Baton Rouge and the Gulf of Mexico; however, the current navigation channel is maintained at 48 feet in most places (USACE 2016). Mississippi River depths can, however, exceed 160 feet in some locations (USACE 2020). River flows are confined within flood protection levees on each side of the river for most of its length. Flood protection levees extend down to Venice on the west side of the river and to Bohemia on the east side of the river (Figure 1.1). Downstream from Bohemia, river flows escape the channel through several natural and man-made openings in the riverbank.

Suspended sediment in the Mississippi River has been monitored since 1949. Suspended sediment concentrations decreased significantly from 1950 to 1966, but minimally since that time. In 1951, suspended sediment loads averaged 1,576,000 tons per day and currently average 436,000 tons per day (Louisiana Coastal Wetlands Conservation and Restoration Task Force [LCWCRTF] 1993). Large quantities of sediment are dredged from the Mississippi River each year as part of the USACE's maintenance of the Mississippi River navigation channel. Large amounts of sediment are also lost to the Gulf of Mexico as river flows reach the deep open waters of the continental shelf.

Typical astronomical tides in coastal Louisiana are diurnal (i.e., one high tide and one low tide per day) and can range as much as 2 feet in the spring, but the mean tidal range is 0.51 feet (USACE 2016). There is tidal influence on the lower Mississippi River and its associated wetland habitats, but that influence differs throughout the year pending seasonal and weather conditions and flood stage of the river.

There are three hydrologic basins in proximity to the Incident location: the Pontchartrain Basin to the north, the Barataria Basin to the west, and the Breton Sound Basin to the east. Those hydrologic basins are influenced by the Mississippi River on a seasonal basis pending water levels in the river and the operation of spillways and sediment diversions.

2.1.3 Water Quality

As part of its surface water quality monitoring program, the LDEQ routinely monitors 25 parameters on a monthly basis using a four-year cycle fixed site network, as well as a long-term network of 21 sites (LDEQ 2018). Each year of the four-year cycle runs from October through September for a given set of sites before changing to the next set. Long-term network sites are sampled every month and year regardless of the four-year cycle. Based on those data and the use of less-continuous information, such as fish consumption and swimming advisories, the LDEQ assesses water quality fitness for the following uses: primary contact recreation (swimming), secondary contact recreation (boating), fish and wildlife propagation (fishing), drinking water supply, outstanding natural resource use, agriculture, and shellfish propagation (LDEQ 2018). Based on existing data, water quality is determined to be either fully supporting or not supporting those uses.

The LDEQ currently maintains two water quality monitoring sites near the projects considered by the Trustees. Both sites are part of the four-year cycle network. One site, located in South Pass south of Pilot Town, represents subsegment 070401. The second site, located in East Bay (also south of Pilot Town), represents subsegment 070601. The nearest water quality monitoring station located in the Mississippi River is near Belle Chasse, approximately 77 miles upstream from Head of Passes. That station and one other upstream station are used to assess water quality in the Mississippi River from Monte Sano Bayou, near Baton Rouge, to Head of Passes, subsegment 070301. Table 2.1 provides a summary of the 2018 Integrated Report Assessments for the three lowest subsegments of the Mississippi River.

Table 2.1. Combined monitored and evaluated assessments of water quality for the Mississippi River (LDEQ 2018).

Waterbody Subsegment Code	Location Description	Primary Contact Recreation	Secondary Contact Recreation	Fish and Wildlife Propagation
070301	Mississippi River – from Monte Sano Bayou to Head of Passes	Full	Full	Full
070401	Mississippi River Passes – Head of Passes to Mouth of Passes; includes all passes in the Bird's Foot Delta (Estuarine)	Full	Full	Full

070601	Mississippi River Basin Coastal Bays and Gulf Water to the State 3-mile limit	Full	Full	Not Supporting

2.1.4 Air Quality

The LDEQ maintains a statewide monitoring network that consists of 43 air-monitoring stations. The data collected are used to determine compliance with national ambient air quality standards (NAAQS) and track trends in air quality. The USEPA Office of Air Quality Planning and Standards set NAAQS for six principal pollutants considered harmful to public health and the environment. Termed criteria pollutants, the six are: carbon monoxide (CO), lead (Pb), nitrogen dioxide (NO_2), ozone (O_3), particulate (PM2.5 and PM10), and sulfur dioxide (SO_2). Volatile organic compounds, many of which are hazardous air pollutants, are not listed as criteria air pollutants but are measured at selected sites throughout Louisiana. Units of measure for the standards are parts per million (ppm) or parts per billion (ppb) by volume, milligrams per cubic meter of air (mg/ m^3), and micrograms per cubic meter of air ($\mu g/m^3$).

The Clean Air Act establishes two types of national air quality standards, primary and secondary. Primary standards set limits to protect public health, including the health of sensitive populations such as asthmatics, children, and the elderly. Secondary standards set limits to protect public welfare, including protection against decreased visibility, damage to animals, crops, vegetation, and buildings. A geographic area that meets or exceeds primary standards is classified as an attainment area. Areas that violate NAAQS for one or more of the six criteria pollutants are classified as nonattainment areas. Table 2.2 provides standards for each pollutant and attainment status for Louisiana.

Information on nonattainment/maintenance status for each parish by year can be accessed at: https://www3.epa.gov/airquality/greenbook/anayo_la.html

Table 2.2. National Ambient Air Quality Standards (EPA n.d.) and Louisiana Attainment Status (LDEQ 2016).

Pollutant	Primary/ Secondary	Averaging Time	Level	Form	Attainment Status
Carbon Monoxide	Primary	8 – hour 1 – hour	9.0 ppm 35.0 ppm	Not to be exceeded more than once per yr	Attainment
Lead	Primary and Secondary	Rolling 3 month avg	0.15 $\mu m/m^{3a}$	Not to be exceeded	Attainment
Nitrogen Dioxide	Primary Primary and Secondary	1 – hour Annual	100.0 ppb 53.0 ppb[b]	98th percentile of 1 – hr daily max conc, avgd over 3 yrs Annual mean	Attainment
Ozone	Primary and Secondary	8 – hour	0.070 ppm[c]	Annual 4th highest daily	Attainment

				max 8 hr concentration avgd over 3 yrs	
Particle Pollution PM2.5	Primary Secondary Primary and Secondary	Annual 24 hour	12.0 μm/m^3 15.0 μm/m^3 35.0 μm/m^3	Annual mean avgd over 3 yrs 98th percentile, avgd over 3 yrs	Attainment
Particle Pollution PM 10	Primary and Secondary	24 – hour	150.0 μm/m^3	Not to be exceeded more than once per yr on avg over 3 yrs	Attainment
Sulfur Dioxide	Primary Secondary	1 – hour 3 – hour	75.0 ppb[d] 0.5 ppm	99th percentile of 1 – hr daily max conc avgd over 3 yrs Not to be exceeded more than once per yr	Non-attainment for St. Bernard Parish only

[a] In areas designated nonattainment for the Pb standards prior to the promulgation of the current (2008) standards, and for which implementation plans to attain or maintain the current (2008) standards have not been submitted and approved, the previous standards (1.5 μg/m^3 as a calendar quarter average) also remain in effect.
[b] The level of the annual NO_2 standard is 0.053 ppm. It is shown here in terms of ppb for the purposes of clearer comparison to the 1-hour standard level.
[c] Final rule signed October 1, 2015, and effective December 28, 2015. The previous (2008) O_3 standards additionally remain in effect in some areas. Revocation of the previous (2008) O_3 standards and transitioning to the current (2015) standards will be addressed in the implementation rule for the current standards.
[d] The previous SO_2 standards (0.14 ppm 24-hour and 0.03 ppm annual) will additionally remain in effect in certain areas: (1) any area for which it is not yet 1 year since the effective date of designation under the current (2010) standards, and (2) any area for which an implementation plan providing for attainment of the current (2010) standard has not been submitted and approved and which is designated nonattainment under the previous SO_2 standards or is not meeting the requirements of a SIP call under the previous SO_2 standards (40 CFR 50.4(3)). A SIP call is an EPA action requiring a state to resubmit all or part of its State Implementation Plan to demonstrate attainment of the required NAAQS.

2.1.5 Noise

The Noise Control Act of 1972 (42 U.S.C. §4901 et seq.) establishes coordination of Federal noise-control activities and provides information to the public regarding noise emissions. There are many different sources of noise in and near the proposed restoration project areas including but not limited to commercial and recreational boats, automobiles and trucks; aircraft; and industry-related noise (such as oil and gas facilities).

The primary sources of noise in the nearshore environment are transportation and construction related activities. Transportation noise includes traffic noise from automobiles, trucks, and motorcycles; railway transportation services; and aircraft (including helicopters) take-offs, landings, and overflights from public and private airfields. Construction noise is created during a variety of activities, including but not limited to, construction and demolition projects, site preparation (e.g., land clearing, grading, excavation), and repair and maintenance activities. These actions can result in relatively high noise levels within several hundred feet of the activity. Noise levels generated can fluctuate depending on the type, number, and duration of use of heavy equipment for construction activities and can differ in effect by the type of activity, existing site conditions (vegetation to buffer sound) and existing ambient noise levels.

2.2 Biological Environment

2.2.1 Vegetation

Vegetative communities are very diverse along the lower Mississippi River in Plaquemines and St. Bernard Parishes. Typically, fresher vegetative communities (e.g., batture forest, BLH forest, swamp, or fresh marsh) occur near the river with a gradation to saline marsh toward Breton Sound to the east and Barataria Bay to the west. Tree species common to BLH forests include, but are not limited to, various water-tolerant oak species, red maple, sweetgum, hackberry, bitter pecan, water hickory, and planar tree. Swamps are commonly dominated by bald cypress and tupelo gum with occasional black willow and red maple. Species common to all four marsh types (i.e., fresh, intermediate, brackish, and saline) are found in many areas. Emergent marsh species include elephant's ear, common reed, bulltongue, alligatorweed, delta duck potato, soft rush, black needlerush, smartweed, Walter's millet, saltmeadow cordgrass, saltmarsh cordgrass, freshwater threesquare, Olney bulrush, saltmarsh bulrush, torpedograss, giant cutgrass, deer pea, and cattail. Spoil banks and natural ridges include black willow, rattlebox, eastern baccharis, elephant's ear, deer pea, and common reed. Submerged and floating-leaved species include Eurasian milfoil, southern naiad, sago pondweed, curly-leaf pondweed, big pondweed, and water stargrass. All of the wetland habitats affected by the Incident and that would be affected by the preferred restoration alternative provide ecosystem services, such as filtration, protection of inhabited coastal areas from wind and storm surge during tropical weather systems, and protection of freshwater vegetative communities in the upper basin from increased marine/tidal influence.

2.2.2 Aquatic Habitat

Aquatic habitat of the lower Mississippi River and Bird's Foot Delta consists of surface water, sediments, overhanging vegetation, woody structures, pools, riffles, intertidal emergent vegetation, and mudflats that support all or a portion of the lifecycles of plants, benthic invertebrates, fish, other aquatic organisms, reptiles, amphibians, birds, and mammals. Benthic invertebrates are vitally important in the aquatic food chain, playing essential roles in energy and nutrient transfer from primary producers, such as algae and phytoplankton, to predatory fish, and as decomposers. Benthic invertebrates include organisms such as clams, snails, mussels, and the larval forms of some insects (e.g., dragonflies, midges, mayflies).

A number of factors contribute to the degradation of aquatic habitat in the Mississippi River and its tributaries, including the release of hazardous substances, nonpoint source pollution, stream channelization, urban and suburban development, industrial development, and oil and gas exploration and development.

2.2.3 Fisheries

The Mississippi River and its distributaries and associated wetlands provide habitat for a diversity of freshwater fisheries many of which are commercially and recreationally important. The freshwater fish community of the lower Mississippi River includes, but is not limited to, sturgeons, common carp, buffalofishes, carpsuckers, blue sucker, catfishes, silversides, darters, freshwater drum, skipjack herring, crappie, minnows, chubs, sunfishes, bass, paddlefish, gars, and shads (Baker et. al. 1991). Other aquatic organisms such as the river shrimp (*Macrobrachium ohione*) also inhabit the river and provide a food source for commercial and recreational fishes.

The Bird's Foot Delta supports a diverse assemblage of estuarine-dependent fishes and shell-fishes, and species present is largely dictated by river flood stage, salinity levels, and season. During low-salinity periods, species such as Gulf menhaden, blue crab, white shrimp, and striped mullet may be present in the area. During high-salinity periods, more salt-tolerant species such as spotted seatrout, black drum, red drum, Atlantic croaker, sheepshead, southern flounder, and brown shrimp may move into the area. Wetlands throughout the area also support small resident fishes and shellfish such as least killifish, sheepshead minnow, sailfin molly, grass shrimp and others. Those species are typically found along marsh edges or among submerged aquatic vegetation and provide forage for a variety of fish and wildlife.

2.2.4 Essential Fish Habitat

Features of the proposed marsh creation project within the Bird's Foot Delta (see section 4.3.2.2) may be located within an area identified as Essential Fish Habitat (EFH) by the Magnuson-Stevens Fishery Conservation and Management Act (MSFCMA). The 1998 generic amendment of the Fishery Management Plans for the Gulf of Mexico prepared by the Gulf of Mexico Fishery Management Council identifies EFH in the potential project area to be estuarine emergent wetlands, submerged aquatic vegetation, estuarine water column, and mud, sand, shell, and rock substrates. Under the MSFCMA, wetlands and associated estuarine waters in the project area are identified as EFH for postlarval/juvenile and subadult brown shrimp; postlarval/juvenile and subadult white shrimp; and postlarval/juvenile, subadult, and adult red drum. Table 2.3 provides a more detailed description of EFH within the project area.

Table 2.3. EFH requirements for managed species that may occur in the preferred marsh creation project area.

Species	**Life Stage**	**Essential Fish Habitat**	**Occurrence in Project Area**
Brown shrimp (*Farfantepenaeus aztecus*)	post-larval/ juvenile	marsh edge, SAV, tidal creeks, inner marsh	All habitats are found throughout the project area
	subadult	mud bottoms, marsh edge	All habitats are found throughout the project area

White shrimp (*Litopenaeus setiferus*)	post-larval/ juvenile, subadult	marsh edge, SAV, marsh ponds, inner marsh, oyster reefs	All habitats are found throughout the project area (excluding oyster reefs)
Red drum (*Sciaenops ocellatus*)	post-larval/ juvenile	SAV, estuarine mud bottoms, marsh/water interface	All habitats are found throughout the project area
	subadult	Mud bottoms, oyster reefs	All habitats are found throughout the project area (excluding oyster reefs)
	Adult	Gulf of Mexico and estuarine mud bottoms, oyster reefs	Estuarine mud bottoms are found within open water areas

2.2.5 Wildlife

The forested wetlands associated with the lower Mississippi River support a wide variety of plant and animal species. Twenty-four migratory bird Species of Greatest Conservation Need (SGCN), as identified by the Louisiana Wildlife Action Plan (WAP), are associated with batture forest, BLH forest, and cypress-tupelo-blackgum swamp in Plaquemines and St. Bernard parishes (Holcomb et al. 2015). Wood stork, swallow-tailed kite, bald eagle, chimney swift, yellow-throated vireo, and prothonotary warbler (all SGCN) occur in all of these forest types in the region, and 18 additional bird SGCN occur in one or more of these forest habitats (Holcomb et al. 2015). Many other bird species, including herons, egrets, woodpeckers, and additional songbirds also utilize these forested wetlands. Bald eagles nest in the region, although no known nest locations occur in the proposed project area. Other wildlife utilizing forested wetlands along the Mississippi River includes, but is not limited to, white-tailed deer, swamp rabbit, northern raccoon, and various species of frogs, toads, and salamanders.

The Bird's Foot Delta provides expansive salt, brackish, intermediate and freshwater marsh habitats that are important for many species of wildlife, including birds, mammals, reptiles, and amphibians. Of 41 bird SGCN associated with these marshes in Plaquemines and St. Bernard parishes, 22 occur within all four identified marsh types, including mottled duck, northern pintail, canvasback, redhead, lesser scaup, least bittern, glossy ibis, roseate spoonbill, osprey, bald eagle, black rail, king and clapper rails (depending on salinity), marbled godwit, dunlin, short-billed dowitcher, gull-billed tern, Caspian tern, Forster's tern, short-eared owl, and Nelson's sparrow (Holcomb et al. 2015). An additional 11 bird SGCN are associated with three of the four marsh types in the area, including brown pelican, American bittern, little blue heron, reddish egret, least tern, royal tern, Sandwich tern, loggerhead shrike, sedge wren, marsh wren, and LeConte's sparrow (Holcomb et al. 2015).

Mammals found within the Bird's Foot Delta include nutria, muskrat, mink, river otter, and raccoon, all of which are commercially important furbearers. Reptiles and amphibians are common in the low-salinity brackish and intermediate marshes found within the area. These include the American alligator, western cottonmouth, water snakes, speckled kingsnake, rat snake, and eastern mud turtle. Amphibians expected to occur in the area include the bullfrog, southern leopard frog, and Gulf coast toad.

2.2.6 Endangered and Threatened Species

The Endangered Species Act of 1973 (87 Stat. 884, as amended; 16 U.S.C. § 1531, et seq.) instructs federal agencies to carry out programs for the conservation of endangered and threatened species and to conserve the ecosystems upon which these species depend. The LDWF's Wildlife Diversity Program also lists species that are of special concern to the state. Table 2.4 provides a list of federal and state recognized endangered or threatened species known to occur in Plaquemines and St. Bernard Parishes where the preferred restoration alternative would occur.

Requests to review projects for potential impacts to endangered and threatened species protected by federal and state laws are sent to the FWS's Louisiana Ecological Services Office and the LDWF's Wildlife Diversity Program, respectively. Those reviews would be completed as part of the project-specific planning processes and selected projects will be modified as necessary to avoid adverse impacts on federal and state listed species.

Table 2.4. Federal and State Endangered and Threatened Species and their critical habitats in Plaquemines Parish, Louisiana[3].

Species	Critical Habitat (CH)	Federal Status	State Status
Mammals			
West Indian manatee (*Trichechus manatus*)	None in Louisiana	Threatened	S1N[a]
Sperm whale (*Physeter macrocephalus*)	None in Louisiana	Endangered	SZ[b]
Bryde's whale (*Balaenoptera edeni*)	None	Endangered	------
Birds			
Eastern black rail (*Laterallus jamaicensis jamaicensis*)	None	Threatened	S2N[c]/ S1B[d]
Piping plover (*Charadrius melodus*)	Yes	Threatened	S2N
Red knot (*Calidris canutus rufa*)	None	Threatened	S2N
Reptiles			
Green sea turtle (*Chelonia mydas*)	None in Louisiana	Threatened[e]	S1N
Hawksbill sea turtle (*Eretmochelys imbricata*)	None in Louisiana	Endangered[e]	SZ
Kemp's Ridley sea turtle (*Lepidochelys kempii*)	None in Louisiana	Endangered[e]	S1B, S3N[f]
Leatherback sea turtle (*Dermochelys coriacea*)	None in Louisiana	Endangered[e]	SZ
Loggerhead sea turtle	None in Louisiana	Threatened[e]	S1B, S3N

[3] Current federally and state listed species lists for Plaquemines and St. Bernard Parishes were accessed on March 11, 2021, at https://www.fws.gov/southeast/pdf/fact-sheet/louisiana-ecological-services-field-office-t-and-e-species.pdf, https://www.fisheries.noaa.gov/southeast/consultations/southeast-region, and https://www.wlf.louisiana.gov/assets/Resources/Publications/Wildlife_Action_Plans/Wildlife_Action_Plan_Revisions_2019.pdf.

Species	Critical Habitat (CH)	Federal Status	State Status
(*Caretta caretta*)			
Fish			
Atlantic sturgeon (*Acipenser oxyrhynchus desotoi*)	Yes	Threatened[e]	S1[g]
Pallid sturgeon (*Scaphirhynchus albus*)	None	Endangered	S1
Shovelnose sturgeon (*Scaphirhynchus platorynchus*)	None	Threatened (S/A)[h]	S4[i]
Smalltooth sawfish (*Pristis pectinata*)	None in Louisiana	Endangered	S1

[a] S1N = Critically imperiled in Louisiana because of extreme rarity (5 or fewer known extant populations) or because of some factor(s) making it especially vulnerable to extirpation; the occurrence of nonbreeding individuals.
[b] SZ = Transient species in which no specific consistent area of occurrence is identifiable
[c] S2N = imperiled in Louisiana because of rarity (6 to 20 known extant populations) or because of some factor(s) making it very vulnerable to extirpation; the occurrence of nonbreeding individuals.
[d] S1B = Critically imperiled in Louisiana because of extreme rarity (5 or fewer known extant populations) or because of some factor(s) making it especially vulnerable to extirpation; the occurrence of breeding individuals.
[e] The United States Fish and Wildlife Service and the National Marine Fisheries Service share consultation authority for these species.
[f] S3N = Rare and local throughout the state or found locally (even abundantly at some of its locations) in a restricted region of the state, or because of other factors making it vulnerable to extirpation (21 to 100 known extant populations); the occurrence of nonbreeding individuals.
[g] S1 = Critically imperiled in Louisiana because of extreme rarity (5 or fewer known extant populations) or because of some factor(s) making it especially vulnerable to extirpation
[h] S/A = Similarity of Appearance. For law enforcement purposes shovelnose sturgeon are classified as "Threatened due to Similarity of Appearance" wherever they coexist with the endangered pallid sturgeon. They are biologically neither endangered nor threatened but this designation extends the Endangered Species Act take prohibitions to shovelnose sturgeon, shovelnose-pallid sturgeon hybrids, and their roe when associated with a commercial fishing activity.
[i] S4 = apparently secure in Louisiana with many occurrences (100 to 1,000 known extant populations).

2.2.7 Historic and Cultural Resources

Various cultural resources occur throughout the Louisiana coastal zone, including both prehistoric and historic sites. Ever since the early 1600s when the French explorer René-Robert Cavelier, Sieur de La Salle, successfully reached the mouth of the Mississippi River, the delta has become widely known as an area with an abundance of fish and wildlife resources. A variety of cultures have existed in the region, including Native American, Spanish, French, British, Acadian (Cajun), Creole, and African.

Two National Historical Monuments are located along the lower Mississippi River, but they are not located within any of the proposed project areas for the preferred alternative. Fort Jackson is located on the right descending bank near RMM 20 and Fort St. Philip is located across the river on the left descending bank. They served as the Confederate Army's primary defensive positions protecting New Orleans during the Civil War. Access to Fort St. Philip is limited, and it is in a lesser state of preservation than Fort Jackson, which is a well-maintained and popular point of

interest for tourists. Fort Jackson also serves as the location of Plaquemines Parish's annual Parish Fair and Orange Festival each December.

Remnant army facilities from World War II occur within the proposed forest enhancement site of the preferred alternative. A National Historic Preservation Act evaluation will be conducted as part of the project-specific planning process and the selected project(s) will be modified as necessary to avoid impacts to historical and cultural resources.

2.3 Economic and Human Use Resources

Lands within Plaquemines and St. Bernard Parishes are directly used for agriculture, residential, commercial, and industrial development. Forested wetlands and emergent marshes of the parishes are regularly used for commercial and recreational crabbing, trapping, hunting, and fishing. Ecotourism (e.g., bird and wildlife viewing) is also increasing in importance in these areas. Oil and gas exploration and production also occur throughout the region.

Emergent wetlands provide essential nursery habitat for commercially and recreationally important fishes and shellfishes such as Gulf menhaden, red drum, spotted seatrout, southern flounder, brown shrimp, white shrimp, blue crab and others. In 2016, commercial fishery landings in coastal Louisiana exceeded 1.2 billion pounds with a dockside value of over $426 million (NOAA 2017). More blue crab was caught in Louisiana (40.1 million pounds) than in any other state, producing revenue of more than $49.4 million (NMFS 2018) and Louisiana has led the United States in shrimp landings every year since 2000 (LDWF 2016). Additionally, Louisiana's oyster production accounted for an average of 34% of annual landings of all oysters in the United States from 1997 through 2017 (LDWF 2020). Landings revenue for saltwater recreational fishing in the Gulf Region totaled $858 million in 2015 with the highest revenue ($373 million) in Louisiana (NMFS 2018).

Louisiana's coastal wetlands continue to support fur harvest and produce more alligator skins than any other State in the nation. As of 2018, nutria, raccoon, beaver and river otter constitute 87 percent of the total value (over $1 million dollars annually) within Louisiana's fur industry (Louisiana Fur Advisory Council 2018). The state's wild alligator harvest continues to represent an important economic resource. Since 1972, over one million wild alligator skins have been harvested, over 10 million alligator eggs have been collected and over 6.4 million farm raised alligators have been sold bringing in millions of dollars of revenue to landowners, trappers and farmers. Conservative estimates have valued these resources at over $100 million dollars annually, providing significant, direct economic benefit to Louisiana (Louisiana Alligator Management Program 2018).

Plaquemines Parish, Louisiana has one of the smaller populations in Southeast Louisiana. According to the US Census Bureau 2019 data (US Census Bureau n.d.), Plaquemines Parish population of 23,197 was primarily White (69.4%). Minorities reported in the Parish included: Black or African American, American Indian or Alaska Native, Asian, and Native Hawaiian or other Pacific Islander. The mean household income was reported to be $52,386 and 15.5% of the Parish population lived below the poverty line. Of those under age 65 living in the Parish, 7.7% had a disability and 10.3% lived without health insurance.

3 INJURY ASSESSMENT AND QUANTIFICATION

This chapter describes the Trustees' assessment of the nature, degree, and extent of injuries to natural resources and services resulting from the Incident. The chapter begins with an overview of data collected during the Preassessment phase of the NRDA process. Section 3.2.1 describes the Trustees' assessment strategy, including the approaches used to identify, determine, and quantify potential injuries. The remainder of the chapter presents the results of Trustee injury assessments for the specific resources affected by the Incident. Results of estimates of injuries are summarized at the end of the chapter in Table 3.10.

3.1 Preassessment Activities and Findings

The Trustees initiated Preassessment activities for the discharge shortly after notification of the Incident. The Trustees focused on collecting ephemeral data that would address three criteria defined by OPA (15 C.F.R. § 990.42) and OSPRA (LAC 43:XXIX.101 et seq.), whether:

- injuries have resulted or probably will result from the Incident;
- response actions have not adequately addressed or are not expected to address the injuries resulting from the Incident; and
- feasible primary and/or compensatory restoration actions exist to address the potential injuries.

The Trustees and ACL delineated the initial spill impact area concurrent with ongoing emergency response actions. Information collected during the Preassessment phase of the Incident is summarized below.

3.1.1 Shoreline Surveys

Overflights, boat surveys, and Shoreline Cleanup and Assessment Technique (SCAT) team data were used to document the trajectory and extent of oiling. Trustee agency personnel participated in those activities throughout the response and made a joint site visit with ACL representatives on July 31, 2008. Trustees and ACL representatives surveyed the east and west banks of the Mississippi River via helicopter from August 11-14, 2008 to determine the nature and degree of oiling along the affected shoreline. Each survey team included three people: two observers and one recorder/time-keeper. The same Trustee and ACL representatives were able to participate in all surveys. Each survey was conducted at an altitude of approximately 300 feet and a speed of approximately 60 mph. The flight path was parallel to the river, and for segments where a higher degree of oiling was suspected or observed, three or more passes over each shoreline segment were conducted (one on the river side of the batture and two on the levee side of the batture). Fewer passes were flown on downstream segments because oiling was only observed on areas of riprap. During each flight, a GPS unit was used to record time and latitude and longitude readings.

Shoreline survey data were recorded for 0.5-mile segments. Observers estimated the overall percent and relative distribution of oil in the batture. The percent of batture containing oil within each 0.5-mile segment was estimated from the edge of the river to the toe of the levee, rounded

to the nearest 5 percent. If no oil was observed, a value of zero was recorded. Each observer provided independent estimates in order to limit any bias. Independent estimates were averaged as joint records of oiling. Video and still photographs were also collected.

Based on the quality of the SCAT data, the Trustees determined that additional ground-truthing of the aerial shoreline surveys was not necessary. In addition to Trustee surveys, aerial photographs (6-inch resolution in 2006 and 1-foot resolution in 2008) provided by the Regional Planning Commission were analyzed using a Geographic Information System (GIS) and aided in determining habitat areas and associated acreages impacted by the discharged oil.

3.1.2 Aquatic Impacts

Following the Incident, the Mississippi River's water level decreased and response personnel observed oil stranded on downstream shorelines and batture areas. The Trustees assumed that the toxicity of the No. 6 fuel oil (Stout and Wang 2016) and the environmental conditions at the time of the Incident (i.e., high turbidity, high flow, elevated water level) likely resulted in the exposure of, potential injury to, and/or mortality of aquatic organisms. Accordingly, the Trustees developed a proposal using juvenile river shrimp as a surrogate species to assess the potential extent of aquatic organism exposure within the water column as a result of the Incident. This shrimp species is well described (Bauer and Delahoussaye 2008) with established migratory behavior and seasonality (peaking in mid to late July and extending through September). Its migratory behavior and seasonality made it highly vulnerable to contact (fouling) with oil from the Incident. Thus, the juvenile river shrimp is a reasonable surrogate species for aquatic life injury assessment.

3.1.3 Sediments and Restoration Material

Some of the oil released from the Incident sank as it was entrained in the sediment-laden waters of the Mississippi River. The Incident affected two ongoing marsh restoration initiatives at two separate locations and the use of river sediment as restoration material for one future marsh restoration at a third location. The three affected restoration projects included sediment mining from maintenance dredging of the Mississippi River, sediment mining at the HDDA for beneficial use of dredged material on the DNWR, and the Bayou Dupont Sediment Delivery System Project (BA-39), all of which are described in further detail below.

3.1.3.1 Maintenance Dredging for River Navigation

On July 28, 2008, two hopper dredges were conducting maintenance dredging in the Mississippi River at Southwest Pass in the vicinity of Head of Passes (Figure 1.3). The dredges reported encountering oil sheen and droplets of oil in the hopper section of the dredge. Initial product samples of the observed oil were collected by the NOAA Scientific Support Coordinator and taken to Louisiana State University for characterization and analysis. Preliminary results confirmed that the oil observed was from the Incident. Additional samples were collected by ACL, NOAA, and USACE on August 8-10, 2008, and results were presented on August 18, 2008, to the Unified Command. A "Phased Dredging Plan" was drafted on July 31, 2008, that allowed for the necessary dredging of the Mississippi River to continue regardless of the

potential oil contamination. The plan was implemented by the USACE, Unified Command, and Trustee agencies.

As a result of the implemented Phased Dredging Plan, 9,282 cubic yards of contaminated material that should have been deposited at the HDDA was deposited at an alternative disposal site (Disposal Site A, Figure 1.3) and removed from use for the subsequent year's sediment mining event cycle. In addition, 34,616 cubic yards of contaminated material was deposited at the HDDA (E. Creef, personal communication 2009). In all, the Trustees estimated that 43,898 cubic yards of restoration material were lost from these activities for restoration purposes due to contamination and/or alternative placement that was not beneficial for marsh restoration.

3.1.3.2 Sediment Mining at the HDDA – Beneficial Use of Dredged Material at DNWR

At the time of the Incident, the USACE was actively mining sediments from the HDDA and placing those sediments on the DNWR via a cutterhead hydraulic dredge in order to create marsh habitat (Figure 3.1). On July 28, 2008, the USACE directed the on-going sediment mining work to cease because of the potential for placing contaminated dredge material onto the refuge. The sediment mining event of 2008 was therefore terminated and 295,880 cubic yards of restoration material were lost/not placed beneficially on the DNWR for habitat creation (R. Scholl, personal communication, November 10, 2009).

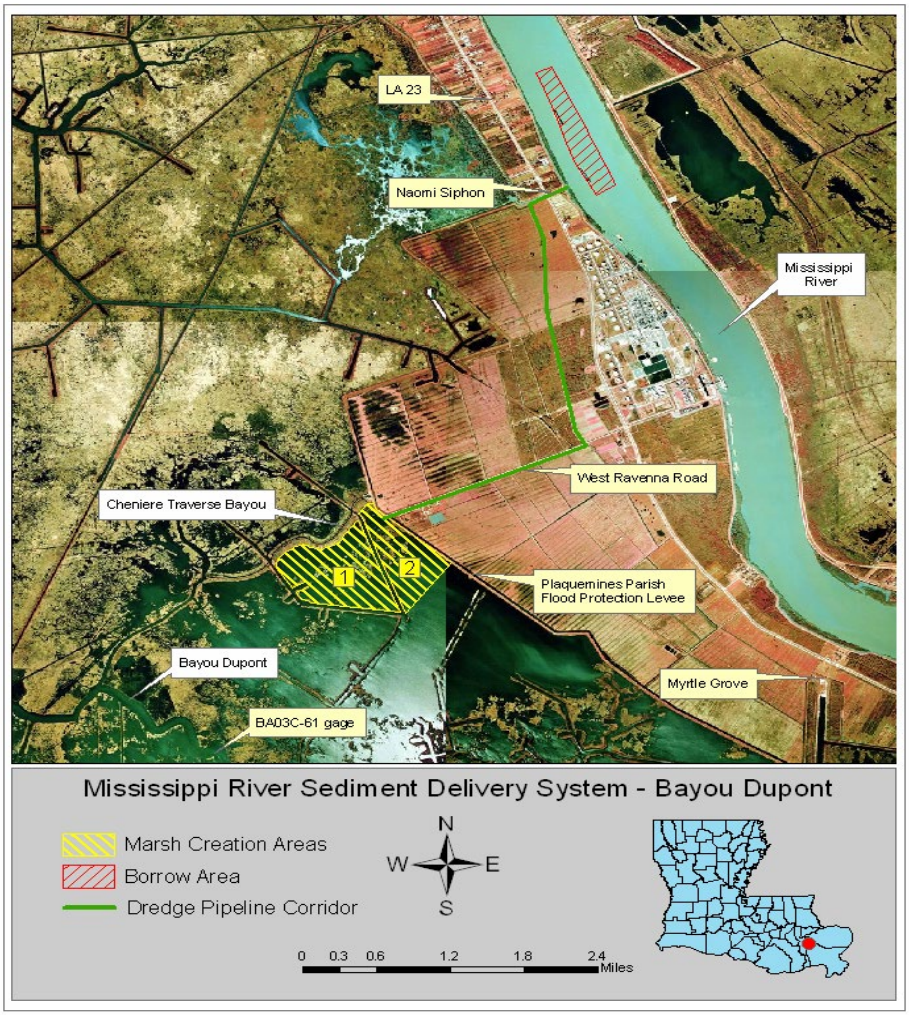

Figure 3.1. Mississippi River Sediment Delivery System - Bayou Dupont (BA-39) project area and features (taken from Lindquist 2007).

3.1.3.3 Bayou Dupont Sediment Delivery System Project (BA-39)

The Incident occurred at RMM 98, approximately 30 miles upstream from the identified borrow area for the BA-39 restoration project (shown in Figure 3.1). Hydraulic dredging in the Mississippi River for the BA-39 project had previously been scheduled to begin shortly after the Incident occurred. Consequently, there was a need to determine if oil was present at the borrow area to prevent pumping potentially contaminated sediments into the marsh ecosystem.

The LDNR and the EPA developed a sampling and analysis plan (shared with ACL on September 17, 2008) to determine the absence or presence of oil from the Incident at the proposed borrow area. A cooperative sampling effort took place on September 23-25, 2008. The results were submitted to the LDNR's Coastal Engineering Division (now Coastal Protection and Restoration Authority [CPRA]) and the EPA on October 16, 2008, and forwarded via email to ACL and LOSCO on October 24, 2008. The required sampling delayed the original construction schedule for the BA-39 restoration project by approximately two months based on the Notice to Proceed date (Table 3.1).

Table 3.1. Scheduled dates for Bayou Dupont construction prior to and after the Incident.

	Schedule Date	
	Before Incident	**After Incident**
Bid Advertisement	8/12/2008	10/1/2008
Pre Bid Meeting	9/23/2008	10/27/2008
Bid Opening	10/14/2008	11/20/2008
Notice to Proceed	12/1/2008	2/4/2009

The Notice to Proceed with project construction is a set date and time based on a predefined process which project managers and engineers must follow in order to obtain a contract through the Louisiana Division of Administration Office of State Purchasing. The delay of two months caused by the Incident represents a delay in marsh services provided to the public.

3.1.4 Birds

The Trustees and wildlife response survey teams conducted field surveys during the response phase of the Incident. Wildlife response survey teams patrolled the Mississippi River, recording the extent and degree of oiled wildlife, collecting oiled dead wildlife, and capturing oiled wildlife (if possible) for rehabilitation. A total of 859 birds observed with visible oil were reported by the Wildlife Group of Unified Command or private citizens along the lower Mississippi River (RMM 0 to 90) between July 24 and August 25, 2008 (Table 3.6).

3.1.5 Recreational Lost Use

During the Incident, portions of the Mississippi River below the discharge site were closed to recreational fishing access and did not reopen to all boat traffic until the evening of July 28, 2008. From July 23-28, 2008, those anglers who would have typically used the river for fishing or access to fishing locations were unable to engage in their desired activity. In addition to

fishing, the Incident affected recreational use of the riverfront[4] in downtown New Orleans from its inception to the final date of clean up (35 days). During that time, locals and tourists who would have typically visited the New Orleans Riverwalk and associated facilities did not make their trips.

3.1.6 Other Potential Impacts

The Trustees examined evidence of injury to mammals, reptiles, and other terrestrial organisms. For example, 26 mammals and 13 reptiles were reported visibly oiled (Table 3.6). The Trustees anticipate that the proposed ecological restoration actions will benefit those resources, thereby helping to ensure that the public and environment are made whole.

3.2 Injury Assessment Methodology

3.2.1 Assessment Strategy

The goal of injury assessment under OPA and OSPRA is to determine the nature, degree, and extent of injuries, if any, to natural resources and services resulting from an incident in order to provide a technical basis for evaluating and scaling restoration actions. After identifying injured resources, the Trustees considered a number of factors to select appropriate injury assessment procedures. The development of these procedures was primarily based on: (1) information gathered during the response and Preassessment phases of the Incident; (2) relevant peer-reviewed literature; and, (3) best professional judgment of the Trustees and other experts familiar with the effects of No.6 fuel oil in similar environments.

The Trustees and ACL agreed to employ simple, cost-effective procedures for collecting data and assessing injuries to natural resources and the ecological services related to those resources, including the development of reasonable and protective assumptions that allowed assessment of injury with less investment of time and money in assessment studies, as allowed for in OSPRA (RS 30:2480(C)(8)). Injuries described herein are organized into the following categories: shoreline habitat (i.e., batture and riprap), aquatic fauna, birds, sediment for restoration projects, and recreational use (i.e., fishing and riverfront use).

3.2.2 Assessment Methods

For injury to shoreline habitats and sediments, the Trustees used a Habitat Equivalency Analysis (HEA) to quantify interim service losses (i.e., service losses incurred from the time of injury until recovery to baseline) for these habitats impacted by the Incident (NOAA 1995). Interim service losses were quantified in terms of lost service acre years, where a service acre year is the flow of services of one acre of habitat over the course of one year. The input parameters for the HEA include the total acres of injured habitat, the initial level of service losses, and the recovery curve of service flows over time.

[4] The riverfront is defined as the area between the Mississippi River and the street car tracks, between the Riverwalk Outlet Mall to the northwest and the wharf to the southeast.

To assess aquatic injury, the Trustees used the juvenile river shrimp as a surrogate species to represent all organisms actually injured in the water column. Injury to juvenile river shrimp was classified as a combination of direct or "initial fouling", which occurred at the time the shoreline was initially oiled, as well as "migratory fouling" as shrimp migrated upstream through oiled shoreline areas. Injury assessments also considered "production foregone," measured either as the growth in organism biomass or number of offspring that would have been produced in the absence of the spill.

To assess the bird injury, the Trustees differentiated between aquatic birds (e.g., laughing gull, killdeer, green heron, etc.) and terrestrial birds (e.g., summer tanager, barn owl, etc.) due to their differing habitat requirements (see Table 3.6). The Trustees used a trophic transfer approach to quantify injury to aquatic birds in terms of equivalent production at the same trophic level as the habitat (i.e., restoration; see French McCay and Rowe 2003). The primary inputs include the total lost biomass (or weight of organic material), the trophic biomass transfer efficiencies, and the marsh plant production for the target habitat restoration. The Trustees used a Resource Equivalency Analysis (REA) to quantify injury to terrestrial birds. The REA was used to evaluate the direct loss (birds killed) of birds over time. Injuries to terrestrial birds were quantified in terms of lost bird years.

The Trustees assessed damages resulting from impairments to two categories of recreational use: (1) recreational fishing, and (2) general riverfront use along the New Orleans Riverwalk. To assess the recreational fishing injury, the Trustees used a benefit-transfer approach to calculate dollar values from forgone trips using estimates of baseline trips from NOAA's Marine Recreational Fisheries Statistical Survey (MRFSS) database and count data from selected sites within the area affected by the Incident. The Trustees used intercept surveys conducted on August 2 and 23, 2008 to estimate lost trips and applied a benefit-transfer approach to calculate a damage estimate for general riverfront use along the Riverwalk.

Injury quantification (including a discount rate of 3 percent per year (NOAA 1999)) is more fully described in the following sections.

3.3 Injury Assessment and Quantification

3.3.1 Shoreline Habitats

The Trustees delineated Mississippi River shoreline affected by the Incident into three categories and then used the aerial survey data collected during the Preassessment phase to determine the spatial extent and degree of the injury associated with those categories for assessment purposes:

- Batture –Shoreline that provides ecological services and is located in the area between the river and the toe of the levee. Included riprap adjacent to oiled batture.
- Riprap – Revetment along the waterfront (i.e., where no batture existed) located in front of industrial areas or other land cover types consisting of crushed stone, concrete block mats, or rock material and provides ecological services.
- Industrial – Developed areas consisting of industrial facilities, seawalls, paved areas, mowed urban lawns, and new borrow areas, that are between the river and the toe of the

levee. The Trustees concluded that these areas did not provide ecological services specifically injured by the Incident. These areas were therefore removed from the assessment.

Because of the difficulty in assessing oiling of riprap during aerial surveys, the aerial survey team included areas of riprap adjacent to visibly oiled wetland habitat the batture category. For all shoreline areas adjacent to industrial facilities, the Trustees assumed that riprap was present at the river's edge except where seawalls were present, and any oiling of that riprap was included in the riprap category. Therefore, the assessment analyzed two habitat categories for shoreline: batture and riprap (Figure 3.2).

The Trustees used GIS to determine the acres of batture and riprap and used the aerial survey data collected during the Preassessment phase to estimate the degree of oiling of those habitats. All riprap was categorized as heavily oiled based on response and Preassessment survey data. Taking into consideration the high-water event at the time of the Incident, the Trustees assumed that all the batture was exposed to some amount of floating oil in the form of sheen because survey data indicated pooled oil throughout the batture once the high water receded. Accordingly, any batture not categorized as heavily oiled was categorized as lightly oiled (i.e., sheen). Table 3.2 and Figure 3.2 represent the results of that analysis. Additional review of the GIS data indicated a potential underestimate in the batture habitat acreages. The Trustees and ACL propose to compensate for the underestimate by applying a 5 percent correction factor for the batture only, represented in Table 3.3 below.

Table 3.2. Acres of batture and riprap impacted by the Incident.

Shoreline Category	Heavily Oiled Acreage	Lightly Oiled Acreage	Total Acreage
Batture	50.24	5,055.89	5,106.13
Riprap	11.79	0.00	11.79

Table 3.3. Acreage of batture and riprap impacted by the Incident with a 5 percent correction factor for batture.

Shoreline Category	Heavily Oiled Acreage	Lightly Oiled Acreage	Total Acreage
Batture	52.8	5,308.7	5,361.5
Riprap	11.79	0.00	11.79

The Trustees used available data to estimate service losses to batture and riprap habitats resulting from the Incident. Riprap provides a substrate for the attachment of algae and refugia for some fish and invertebrate species (Curry 2000), as well as other ecological services. The Trustees assumed that habitats near the discharge before the Incident were healthy and providing 100 percent ecological services. Due to the dynamic nature of the Mississippi River environment (e.g., substantial water fluctuations), the Trustees also assumed that the above-ground vegetation and sediments in lightly oiled batture experienced an initial service loss of 5 percent and would naturally recover to baseline in 6 months on a linear trajectory, and vegetation and sediments in heavily oiled batture experienced an initial 75 percent service loss and would naturally recover to baseline within 3 years on a linear trajectory. Assumed recovery rates are supported by recovery projections in the Type A procedures developed by DOI for natural resource damage

assessments under the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) (43 C.F.R. Part 11). The results of those analyses are illustrated in Table 3.4.

Table 3.4. Affected shoreline acreage and initial service losses in Discounted Service Acre Years (DSAYs).

Shoreline Habitat / Oiling Category	Acres	Initial Service Loss	Time to Recovery (years)	Recovery Trajectory	Injury Estimate (DSAYs)
Batture					
Lightly Oiled	5,308.7	5%	0.5	Linear	66.11
Heavily Oiled	52.8	75%	3	Linear	57.75
Riprap					
Heavily Oiled	11.79	75%	0.5	Linear	2.20

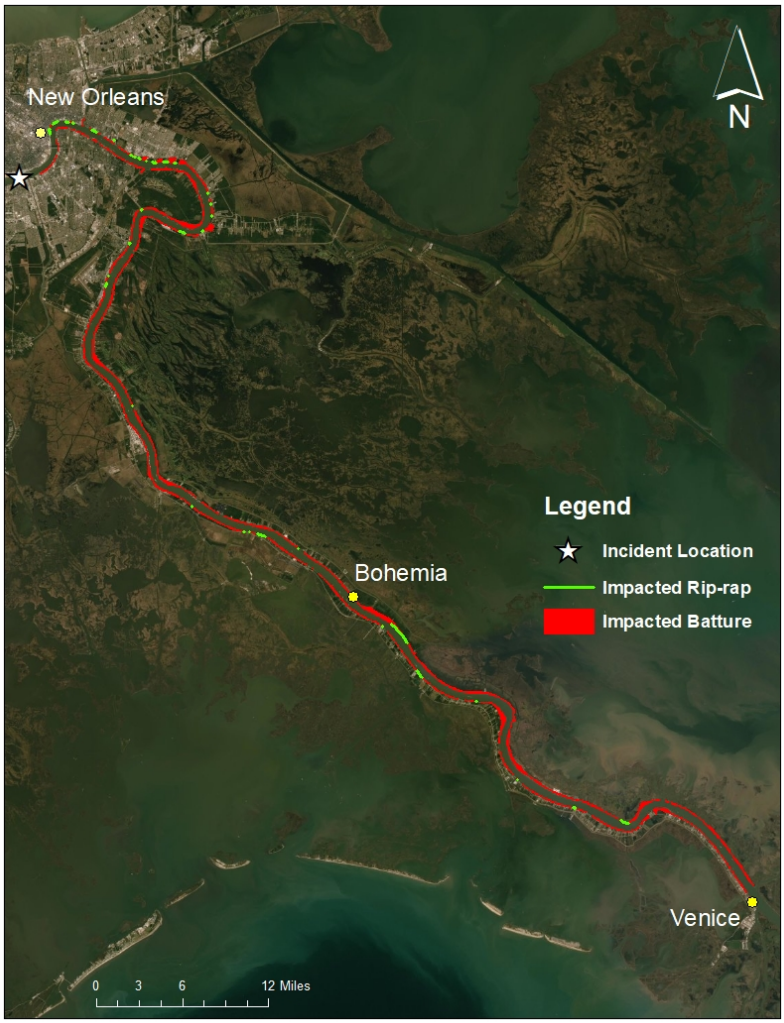

Figure 3.2. Shoreline habitat impacted by the Incident. For the purposes of this document and injury assessment, the batture includes any forested wetlands, scrub-shrub, marsh, and mudflat habitats along the Mississippi River.

3.3.2 Aquatic Fauna

Streamers of black oil and sheen from Barge DM932 were documented across more than 100 miles of the lower Mississippi River. Dead fish were not observed after the Incident, but this is not unusual since river currents and prevailing winds typically keep dead fish from floating to the surface. Rather than conducting an exhaustive survey for affected fish, the Trustees used potential injuries to juvenile river shrimp as a surrogate for injury to aquatic fauna; the use of a surrogate or representative species in determining injury as opposed to a model that includes all potentially injured organisms can expedite assessment while still providing an accurate depiction of resources lost.

The Mississippi River is a major migration corridor for juvenile river shrimp, and the Incident occurred during peak migration. Research conducted by Dr. Ray Bauer and Dr. Frank Truesdale indicates that the upriver migration of juvenile river shrimp peaks in mid- to late-July but extends from July through September (Bauer 2008). Juvenile river shrimp typically migrate from approximately one hour after sunset to just before dawn, following the bank of the river from the water's surface to a depth of approximately 1 m and occasionally "crawling" along the bank above the water's surface in a band approximately 1 m in width (Bauer 2008). The Trustees assumed that the timing of the Incident combined with the shrimp's documented migration behavior made them vulnerable to contact with spilled oil (i.e., fouling); Juvenile river shrimp that were present when oil reached the shoreline and those migrating through oiled batture had a high likelihood of exposure. Accordingly, to address injury to aquatic fauna, the Trustees used the river shrimp as a surrogate species to represent all organisms potentially injured in the water column.

Given SCAT results and aerial surveys, the Trustees estimate that river shrimp were initially exposed to approximately 98.97km of oiled batture. Dr. Ray Bauer (personal communication, January 23, 2009) reports that the juvenile shrimp in the Mississippi River system migrate approximately 4 kilometers (km) per night and the biomass of juvenile river shrimp is equal to approximately 139.81 kilogram (kg) over 1 km of shoreline. Migrating juveniles therefore occupy the equivalent of a corridor 4 km long and 2m wide, which passes a fixed point on the bank of the river in the period of one night. The Trustees consequently estimate that migrating river shrimp were exposed for six nights during the Incident over a length of 130.36 equivalent kilometers. To determine the total lost biomass of river shrimp affected, the density of shrimp (139.81 kg/km) multiplied by the total effective kilometers oiled (229.33 km) yielded an estimated 32,063 kg of river shrimp biomass lost.

3.3.3 Sediment for Restoration Projects

One of Louisiana's highest priorities is restoration of its severely degraded coastal wetlands, which relies heavily on access to and use of Mississippi River sediments. There are two primary ways in which Mississippi River sediments are obtained for the mechanical creation or restoration of marsh: (1) sediment dredged during USACE maintenance of navigation depths in the Mississippi River is used to create and/or nourish marsh, a technique commonly referred to as "beneficial use"; and (2) specific locations in the Mississippi River are identified as borrow

sites for sediments that will be used to create and/or nourish marsh. The latter mechanism's dredging events are not tied to the USACE's maintenance dredging schedule, but rather, are conducted specifically for the purpose of creating and/or nourishing marsh. Both techniques utilize a pipeline to transport the sediment dredged from the Mississippi River bottom to areas designated for marsh creation. These restoration techniques are identified in numerous restoration planning initiatives including the Coast 2050 Plan (LCWCRTF and WCRA 1998), the Louisiana Coastal Area Ecosystem Restoration Study (USACE 2004), and Louisiana's Comprehensive Master Plan for a Sustainable Coast (CPRA 2007, 2012, 2017).

The Incident contaminated or threatened to contaminate river sediment being used for two ongoing marsh restoration initiatives and one planned marsh creation project. This caused a lost use of river sediments for marsh restoration as well as the associated services that those marsh habitats would have provided. Accordingly, the Trustees quantified the loss of marsh habitat caused by lost use of river sediments in terms of lost marsh habitat services.

3.3.3.1 Maintenance Dredging for River Navigation

The Trustees estimated that 43,898 cubic yards of restoration material were lost for restoration purposes as a result of the modifications to dredging actions resulting from oil contamination during the Incident. To calculate the amount of acres that should have been created by this material, the Trustees assumed a theoretical fill area designed with a 9.5-foot crown height and 300-foot crown width with a side slope of 5:1. Assuming a cut-to-fill ratio of 1.5:1, the Trustees estimated that 2.04 acres of marsh habitat were not created due to the modified maintenance dredging event.

The Trustees used a theoretical marsh creation project to calculate the amount of services that 2.04 acres of marsh would have produced to determine an injury estimate. To estimate resulting injuries, the Trustees assumed that the theoretical marsh creation project would:

- be constructed in 2008;
- mature at a linear rate in seven years with no plantings and would be providing full services by 2015;
- have a 50 percent relative productivity as compared to natural marsh; and
- provide 15 years[5] of habitat services following completion date, thus services would end by 2023.

Benefits were then discounted at a rate of 3 percent per year. The final injury estimate from lost maintenance dredging beneficial use is 9.03 DSAYs (Table 3.5).

3.3.3.2 Sediment Mining at HDDA – Beneficial Use of Dredged Material at DNWR

As a result of the Incident, the sediment mining event of 2008 was terminated and 295,880 cubic yards of river sediment were not placed beneficially onto DNWR for marsh creation. To determine the marsh acreage for that lost material, the Trustees again assumed a theoretical fill

[5] A 15-year life span is typical for marshes in the Bird's Foot Delta.

area designed with a 9.5-foot crown height and 300-foot crown width with a side slope of 5:1 to calculate the amount of acres that should have been created by this material. Assuming a cut to fill ratio of 1.5:1, the Trustees estimate that 13.75 acres of marsh habitat were not created.

Like with the lost maintenance dredging, the Trustees estimated injury by using a theoretical marsh creation project to calculate the amount of services that 13.75 acres of marsh would have produced. Using the same project assumptions and discounting rate as those for the maintenance dredge marsh (see Section 3.3.3.1), the final injury estimate from lost Sediment Mining at HDDA is 60.85 DSAYs (Table 3.5).

3.3.3.3 Bayou Dupont Sediment Delivery System Project (BA-39)

The original schedule for the proposed BA-39 project was delayed by approximately two months due to the sediment testing required to determine whether sunken oil from the Incident was present at the proposed project borrow location. The Trustees considered that two-month delay an injury because of delayed provisions of the natural resources and services associated with the planned creation of 493 acres of marsh habitat.

The Trustees again used a theoretical marsh creation project to calculate the habitat service losses of 493 acres for the two-month delay in project implementation. To accomplish this, the Trustees conducted two HEAs, one with a completion date of February 2010 and the other with a completion date of April 2010, and calculated the difference to model the two-month delay in habitat services. To estimate resulting injuries, the Trustees assumed that the theoretical marsh creation project would:

- mature at a linear rate in five years with plantings;
- have a 50 percent relative productivity as compared to natural marsh; and
- provide services for 15 years of habitat services following completion date.

Benefits were then discounted at a rate of 3 percent per year. The difference of the two HEAs resulted in an injury estimate of 11.28 DSAYs (Table 3.5).

Table 3.5. Lost use of river sediment for restoration material in marsh creation projects at the time of the Incident.

Project	Restoration Material Lost (cubic yards)	Acres Affected	Injury Duration	Injury Estimate (DSAYs)
Maintenance Dredging	43,898	2.04	15 years	9.03
Sediment Mining	295,880	13.75	15 years	60.85
Bayou Dupont		493	2 months	11.28
Total		508.79		81.16

3.3.4 Birds

The Trustees utilized the results of field surveys conducted by FWS wildlife response personnel during the Incident to help determine injuries to birds. Between July 24 and August 25, 2008, 859 visibly oiled birds were either observed by response personnel or reported by private citizens

(Table 3.6). Other oiled wildlife (e.g., alligators, turtles, snakes, raccoons, beavers, etc.) were also reported. However, the large size of the affected area and the complexity of river shoreline habitats created environmental conditions in which oiled and dead birds were difficult to find. Other challenges included carcass loss via river currents, poor visibility of oil on dark-colored birds, and hazardous boating conditions preventing bird capture and carcass retrieval. It is reasonable to assume that only a small proportion of expected bird carcasses were found or observed due to a host of limiting factors including, but not limited to, carcass scavenging, sinking, or drifting downriver, and because carcasses are difficult to detect in dense vegetation (see Table 3.7). For those reasons and following API (2009), the Trustees employed a multiplier of 4.0 to estimate total bird mortality. Using this approach, the actual number of oiled birds observed (859 birds) is multiplied by a factor of 4 to arrive at an estimate of the total bird mortality of 3,436.

Table 3.6. Oiled wildlife observed by response personnel or reported by private citizens from July 24 to August 25, 2008 (from ACL Barge DM932-New Orleans, LA, Oil Spill, FWS Report: R4-EC-RST 8/23-25/08 Operational Period, p. 9, by USFWS 2008). The Trustees categorized bird species as either terrestrial or aquatic for purposes of restoration planning.

BIRDS	Count		MAMMALS	Count		REPTILES	Count
Terrestrial birds			Nine-banded Armadillo	1		American Alligator	9
Northern Cardinal	1		Beaver	2		Turtle sp.	1
Summer Tanager	12		Muskrat	1		Water Snake	3
Unknown Passerine sp.	3		Nutria	3			
Mourning Dove	1		Opossum	3			
Rock Dove	7		Raccoon	16			
Common Grackle	1						
American Crow	1						
Black-crowned Night Heron	3						
Great Blue Heron	15						
Yellow-crowned Night Heron	3						
Cattle Egret	23						
Great Egret	326						
Snowy Egret	241						
Unknown Egret sp.	11						
Black-bellied Whistling Duck	9						
Wood Duck	21						
Unknown Duck sp.	38						
Barn Owl	1						
Unknown Hawk sp.	1						
Unknown Vulture sp.	6						
Aquatic birds							
Laughing Gull	5						
Unknown Gull sp.	6						
Unknown tern sp.	2						
Killdeer	1						

Black-necked Stilt	1						
White Ibis	44						
Unknown ibis sp.	4						
Green Heron	3						
Little Blue Heron	23						
Tri-colored Heron	2						
Unknown Heron sp.	8						
Unknown Grebe sp.	2						
Anhinga	2						
Green-winged Teal	2						
Mallard	22						
Mottled Duck	8						
TOTALS	859			26			13

Table 3.7. Rationale for using a multiplier to estimate bird mortality.

Environmental Conditions	Rationale
Time of year the spill occurred (July – August)	• Nesting and presence of juveniles leads to increased stress and competition for food, potentially compounding stresses caused by exposure to the Incident. • Oiled birds likely spent time at rookeries along the spill area, potentially removing themselves away from the spill area and reducing recovery.
River conditions at time of Incident (high water, fast current, strong undertow, increased velocity)	• Attempts by search crews to find oiled birds were more difficult and dangerous at high flows. • Oiled birds struggle with thermoregulation and buoyancy; high water, fast currents and strong undertow likely carried oiled birds and carcasses out of the search area.
Nearby areas may have attracted oiled birds away from the search area	• Rookeries along the spill zone. • Garbage dumps in the area. • Mudflats behind coal barges on the west bank.
Birds previously observed as not oiled were at risk of later oiling	• Contained oil was likely released by ship wakes in areas of active clean-up or resuspended from sediments disturbed by deep-draft vessels. • Hard booms were vandalized and traversed by clean-up contractors and commercial and recreational vessels desiring a shorter route to the Gulf of Mexico, releasing previously trapped oil. • Residual oil remained trapped in riprap.
Weather conditions	• Inclement weather occurred multiple times during clean-up operations, postponing bird and wildlife surveys and recovery.

Of the 36 species of birds observed oiled, the Trustees classified 16 as species of aquatic birds (see Table 3.6). Because both aquatic birds themselves and the specific habitat they relied on was injured, the Trustees articulated injuries to aquatic birds in terms of total services lost, and estimated losses in terms of lost bird production (i.e., lost biomass of birds). Amount of habitat

needed to produce lost production was then calculated to determine restoration needed. The mortality of the aquatic birds group was converted to kg wet weight (ww) (i.e., species-level mass of an adult), multiplied by the number killed for that species, and then divided by a 2 percent ecological efficiency (trophic transfer). The result is the total kg ww of secondary productivity from the species' diet (energy received from benthic fauna) needed to produce a kg of bird (French McCay and Rowe 2003). The final estimate was a loss of 19,553 kg ww of benthic production, equating to the loss of 540 birds of these species. Thus, the Trustees estimate that, of the total mortality of 3,436 birds, 540 were aquatic birds.

Given the above, of the estimated total number of birds killed (3,436), the Trustees categorized 2,896 as terrestrial bird species (see Table 3.6). The Trustees used a Resource Equivalency Analysis (REA) model (Sperduto et al. 2003) to quantify terrestrial bird injury. The REA model used bird life history information to evaluate the direct loss (birds killed) of birds over time. Injury was calculated in discounted bird years (DBYs). Using this methodology, the estimated loss of 2,896 terrestrial birds equates to approximately 8,212 DBYs.

3.3.5 Human Use

The USCG closed the Mississippi River from RMM 98 to the Southwest Pass Sea Buoy (near the Gulf of Mexico) from July 23 until July 29, 2008, affecting human use of natural resources. The Trustees assessed impacts in two categories that were representative of all uses: recreational fishing and general riverfront use along the New Orleans Riverwalk.

3.3.5.1 Recreational Fishing

The Trustees calculated damages from recreational fishing losses by applying literature values per trip to calculated lost trips. Two data sources were used to calculate the number of lost trips, and as shown in Table 3.8 below, the two sources lead to very similar estimates of damages, differing by no more than 5%. The first method calculated the number of baseline trips using NOAA's MRFSS[6] data. The second method involved count data collected at sites within the area affected by the Incident.

On the weekend of October 4 and 5, 2008, the Trustees attempted a total of 137 on-site surveys of anglers at commonly used boat launch sites in Plaquemines Parish downriver from the Incident. Of those, 117 were usable in the recreational fishing damages analysis. The survey presented questions to anglers about their awareness of the spill and how or if they adjusted their recreational fishing activity because of the Incident. More specifically, anglers were questioned about whether they took fewer trips and/or chose alternate locations because of the Incident. The survey questions covered three distinct periods:

1. Trips planned or taken during the last two weeks of July 2008.
2. Trips planned or taken during August through the day before Labor Day in 2008.

[6] The Marine Recreational Fishery Statistics Survey (MRFSS) is a program that ran from 1979-2008 to estimate recreational fishing effort in a broad area nationally, including Louisiana. The program has since been renamed and updated multiple times. More information available here: https://www.fisheries.noaa.gov/recreational-fishing-data/about-marine-recreational-information-program.

3. Trips planned or taken on Labor Day through the date of the intercept (in-person) survey (not including the date of survey itself).

The Trustees determined that results should be representative of baseline angler behavior within the affected area. The results indicated that 24.9% of trips were lost during the first period, 7.7% were lost during the second period, and no trips were lost during the third period.

To estimate total damages, the Trustees used a benefit-transfer approach to convert forgone trips into a dollar value per trip. The Trustees used the Consumer Price Index (CPI) to adjust for inflation and compounded losses using a three percent annual discount rate. Because charter vessel trips and substitute trips were not included in either analysis, there was likely a downward bias in trip estimates. To account for such sources of bias in the data the Trustees applied a 15 percent adjustment (increase) to the total forgone trips. Based on experience in other cases, the adjustment reasonably accounts for such potential bias. The Trustees' estimates of recreational fishing damages are illustrated in Table 3.8 with updated values for inflation and compounded at a three percent annual discounted rate to April 2017.

Table 3.8. Summary of recreational fishing damages.

Total Foregone Trips	8,369 (using count data) to 8,833 (using MRFSS data)
Value per Foregone Trip	$46.70
Estimate of Damages	**$390,807 to $412,482**

3.3.5.2 General Riverfront Use along the New Orleans Riverwalk

There were no closures of the New Orleans Riverwalk during the Incident; however, a noticeable odor along the Riverwalk deterred visitors, resulting in lost (i.e., a person completely avoiding the Riverwalk) and diminished use (i.e., made less enjoyable due to the noticeable odor) of the area during that time. ACL conducted instantaneous intercept counts and intercept surveys on August 2 and 23, 2009, to estimate lost and diminished use of the area. Using results of those surveys, the Trustees converted diminished trips to lost trips to produce an estimate of lost equivalent trips along the Riverwalk.

The Trustees assumed no use of the Riverwalk between 10:00pm and 6:00am. Given the proximity of the Riverwalk to late night establishments such as taverns and a casino, that assumption likely underestimates baseline use of the Riverwalk. The Trustees' estimates of Riverwalk damages are illustrated in Table 3.9 with updated values for inflation and compounded at a three percent annual discounted rate.

Table 3.9. Summary of New Orleans Riverwalk damages.

Total Lost Equivalent Trips[a]	11,683
Value Per Lost Trip	$8.95
Damages	**$136,363**

[a] One Diminished Trip = 0.2 Lost Trip

3.3.5.3 Summary of Human Use Damages

Using values provided in tables 3.8-3.9, the Trustees estimate total damages of $548,845 for human use losses due to the Incident. Values per trip are calculated using benefit-transfer methods, which are standard and acceptable practices, but ones that also have some level of uncertainty. The estimated damages are reasonable given the circumstances of the Incident.

Table 3.10. Summary of all resources/services categories, amount injured, and injury/damages estimates resulting from the Incident.

Injured Resource/Service Category	**Amount Injured**	**Injury/Damages Estimate**
Shoreline Habitats		
Batture	52.8 acres heavy oil 5,308.7 acres light oil	126.07 DSAYs of batture habitat
RipRap	11.79 acres with heavy oil	
Aquatic Fauna	229 km initial fouling and fouling during migration (river shrimp density=139.81 kg/km)	32,063 kg of river shrimp biomass lost
Sediment for Restoration Projects	(a) Maintenance Dredging: 2.04 marsh acres for 15 years (9.03 DSAYs) (b) Sediment Mining: 13.75 marsh acres for 15 years (60.85 DSAYs); Bayou Dupont, 493 marsh acres for 2 months (11.28 DSAYs)	81.16 DSAYs of marsh habitat
Birds		
Aquatic	540 dead birds[a]	19,553 kgww lost biomass
Terrestrial	2,896 dead birds[a]	8,212 DBYs
Human Use		
Recreational Fishing	8,369 to 8,833 foregone trips	$390,807 to $412,482[b]
Riverfront Use	11,683 total lost equivalent trips	$136,363[b]

[a] Based on a multiplier of 4 of the number of oiled birds observed.

[b] The Trustees estimate total damages of $548,845 for human use losses due to the Incident. This represents the $412,482 for the 8,833 recreational fishing foregone trips plus riverfront use damages.

4 RESTORATION ALTERNATIVES

The goal of restoration under OPA is to compensate the public for injuries to natural resources and their services resulting from an oil spill. This goal is achieved through the return of the injured natural resources and their services to baseline conditions and compensation for interim losses from the date of the incident until recovery. To fulfill this purpose, this section introduces potential restoration actions (to be funded by the settlement with ACL) to restore the natural resources and resource services injured by the Incident and identifies the Trustees' preferred alternative.

The assessment completed by the Trustees described in Chapter 3 quantified the amount of injury to natural resources resulting from the Incident. Per section 1006(c)(1)(C) of OPA, Trustee restoration actions must restore the equivalent of the injured resources by providing resources and services of the same type and quality and of comparable value (i.e., restore, rehabilitate, replace or acquire the equivalent) as those injured. The process of "scaling" compensatory restoration actions involves determining the size of the restoration action(s) needed to provide resource and service gains equal to the value of interim losses due to the release of hazardous substances (NOAA 1997, 1999). Because the duration of the injury differs from the lifespan of the restoration action(s), equivalency is calculated in terms of the present discounted value of services lost due to resource injuries and gained due to compensatory restoration.

4.1 Restoration Strategy

Restoration actions are defined as primary or compensatory. Primary restoration actions are actions that restore injured natural resources and services to their baseline condition (that is, their condition prior to the release of oil). Active primary restoration is an action that expedites the return of injured resources to their baseline condition. Compensatory restoration addresses interim losses of natural resource services from the time of initial injury until full recovery of natural resources to their baseline condition. Natural recovery, in which no human intervention is taken to restore the injured resources, is considered a primary restoration alternative, and is appropriate where feasible or cost-effective active primary restoration actions are not available or where the injured resources would recover relatively quickly without human intervention. The scale of compensatory restoration projects depends on the nature, extent, severity, and duration of the resource injury. Active primary restoration actions that speed resource recovery would reduce the scale of compensatory restoration required.

For primary restoration, the Trustees considered both the natural recovery option and active primary restoration at the spill site. Upon completion of emergency response and cleanup activities by ACL, the Trustees decided that active primary restoration would not contribute significantly to the recovery of the injured natural resources due to the dynamic nature of the riverine environment. Although appropriate response actions were taken following the Incident, impacts to the environment were not fully restored and interim ecological service losses were anticipated to ensue. Accordingly, the Trustees determined that a number of potential restoration actions would be needed to compensate the public for the losses, and proceeded with restoration planning. For compensatory restoration, OPA and OSPRA regulations clearly establish Trustee

authority to seek compensation for interim losses if technically feasible, cost-effective alternatives exist. Since interim losses will accrue until restoration compensates for losses, and technically feasible, cost-effective alternatives exist, the Trustees proceeded with identifying compensatory restoration alternatives for the injured resources discussed in Chapter 3. Chapter 4 focuses on the compensatory restoration actions developed.

4.2 Selection of Restoration Alternatives

Both OPA and NEPA require the Trustees to develop reasonable restoration alternatives before selecting their preferred alternative(s). Each alternative must be designed so that, as a package of one or more actions, the preferred alternative would make the environment and public whole. Only those alternatives considered technically feasible and in accordance with applicable laws, regulations, and/or permits are moved forward for further consideration by the Trustees. Once Trustees develop reasonable restoration alternatives, they must evaluate the restoration alternatives based on the criteria found in regulations 15 C.F.R. § 990.54 and listed below.

1. Project cost and cost effectiveness (i.e., cost to carry out each alternative).
2. Nexus to natural resource injuries and services lost (i.e., the extent to which each alternative is expected to meet the Trustees' goals and objectives in returning the injured natural resources and their services to baseline and/or compensating for interim losses).
3. Likelihood of success of each alternative.
4. Avoidance of adverse impacts (i.e., extent to which each alternative will prevent future injury as a result of the incident and avoid collateral injury as a result of implementing the alternative).
5. Multiple resources and services benefits (i.e., extent to which each alternative benefits more than one natural resource and/or service).
6. Public health and safety (i.e., effects of each alternative on public health and safety).

The Trustees then select a preferred restoration alternative(s) based on these factors.

4.2.1 Evaluation of Restoration Types

To streamline the process of developing reasonable restoration alternatives and proposing preferred alternatives for implementation for each injury category, the Trustees looked first to restoration types identified in the Louisiana RRP Program Final Programmatic Environmental Impact Statement.[7] These include the following seven broad categories:

1. Creation/enhancement of habitat;
2. Physical protection of habitat;
3. Acquisition/legal protection of resources and services;
4. Stocking of fauna;
5. Physical protection of fauna;
6. Restoration of recreational resource services; and
7. Restoration of cultural resource services.

[7] Restoration types are described in Section 4.2.3 of the Louisiana Regional Restoration Planning Program Final Programmatic Environmental Impact Statement (NOAA et al. 2007).

Next, the Trustees selected a subset of appropriate restoration types by identifying those with a strong nexus to the injured natural resources and their services (Table 4.1). Doing so would ensure that compensatory restoration alternatives considered would provide services of the same type, quantity, and of comparable values as those lost. Through this process, the Trustees identified the following five restoration types with a strong nexus to the injury as their preferred restoration types for this case:

1. Acquisition/legal protection of coastal forested wetlands (Ac/LP CFW).
2. Creation/enhancement of coastal forested wetlands (C/E CFW).
3. Creation/enhancement of coastal herbaceous wetlands (C/E CHW).
4. Restoration of lost recreational resource services related to fishing.
5. Restoration of lost recreational resource services related to riverfront use.

The Trustees selected these preferred restoration types for the following reasons:

1. Under the RRP Program these are appropriate restoration types for compensating for interim losses of ecological services resulting from the Incident.
2. The preferred restoration types are proven, cost-effective, and successful restoration approaches for increasing the types of natural resources, habitats and resource services that were injured as a result of the Incident.
3. The Trustees have developed methods for estimating costs of the future implementation of these types of restoration projects and therefore could develop a cash value to facilitate settlement with ACL.

Table 4.1. Restoration types that would compensate for injured natural resources.

COASTAL			POTENTIALLY INJURED RESOURCES/SERVICES								
			Herbaceous Wetlands	Forested Wetlands	Beach/Shoreline/ Streambed	Oyster Reefs (& other)	Water Column Org.	Birds	Wildlife	Recreational	Cultural
RESTORATION TYPES	C/E[1]	Coastal Herbaceous Wetlands	√	√		√	√	√	√	√	
		Coastal Forested Wetlands	√	√			√	√	√	√	
		Coastal Beach/Shoreline/Streambed			√		√	√	√	√	
		Coastal Oyster Reefs (& other)				√	√	√	√	√	
		Coastal Artificial Reefs				√	√	√	√	√	
		Coastal SAV	√			√	√	√	√	√	
	PP[2]	Coastal Herbaceous Wetlands	√	√		√	√	√	√	√	
		Coastal Forested Wetlands	√	√			√	√	√	√	
		Coastal Beach/Shoreline/Streambed			√		√	√	√	√	
	Ac/LP[3]	Coastal Herbaceous Wetlands	√	√		√	√	√	√	√	
		Coastal Forested Wetlands	√	√			√	√	√	√	
		Coastal Beach/Shoreline/Streambed			√		√	√	√	√	
		Coastal Oyster Reefs (& other)				√	√	√	√	√	
		Coastal SAV	√				√	√	√	√	
	S[4]	Coastal Water Column Org.					√			√	
		Coastal Oyster Reefs (& other)				√	√			√	
		Birds						√		√	
		Wildlife							√	√	
	PF[5]	Birds						√		√	
		Wildlife							√	√	
		Recreation								√	
		Cultural									√

(1) Creation/Enhancement
(2) Physical Protection of Habitat
(3) Acquisition/Legal Protection
(4) Stocking of Fauna
(5) Physical Protection of Fauna

4.2.2 Identifying Potential Restoration Actions

Following the identification of the preferred restoration types, the Trustees conducted an initial screening of potential restoration projects, or actions, available in the hydrologic basins in which

the natural resources were injured (RRP Program Regions[8] 1 and 2) to develop the range and type of available restoration actions. Forty-five (45) preliminary restoration actions matched one or more of the preferred restoration types for the injured resources in RPP 1 and 2 (Appendix A). All of the actions were submitted by or obtained from the public and government agencies. The Trustees screened these 45 restoration actions to identify the most appropriate options for this case.

The Trustees used the OPA criteria listed in Section 4.2 above and the following RRP Program-specific criteria during the screening process to identify a suite of preferred restoration actions: (a) ability to implement project with minimal delay; (b) degree to which project supports existing strategies/plans; and, (c) project urgency. The Trustees also considered the stage of development of the potential projects; the extent to which the projects would support, or are consistent with national, regional, and/or local restoration initiatives including Louisiana's Comprehensive Master Plan for a Sustainable Coast (CPRA 2017); the ability of the restoration project to be integrated into an existing resource management program or larger project; and the ability of the restoration action to be added to a project already under consideration.

The Trustees identified a number of potential restoration actions during screening that met their restoration goals and criteria; however, several of these restoration actions were funded by other sources during the course of the Trustees' restoration planning process. These restoration actions are described in Section 4.4 below as projects considered but eliminated from further evaluation.

4.3 Evaluation of the Potential Restoration Alternatives

4.3.1 No Action/Natural Recovery Alternative

NEPA requires the Trustees to consider a "no action" alternative, and OPA requires consideration of the "natural recovery" option. In this case, these options are equivalent. Under this alternative, the Trustees would take no direct action to restore injured natural resources or compensate the public for lost services pending environmental recovery. Instead, the Trustees would rely on natural processes for recovery of the injured natural resources. The principal advantages of this approach are the ease of implementation and cost-effectiveness. This approach relies on the capacity of ecosystems to "self-heal" and, in this case, is appropriate for primary restoration.

The no action/natural recovery alternative is rejected for compensatory restoration for this Incident. The Trustees' assessment of natural resource injuries indicates that losses occurred as a result of the Incident. Response actions undertaken may allow the injured resource to recover, but those actions would not compensate the public for the resource services lost over time. Such compensation serves to make the public and the environment whole. OPA provides that the public be compensated for such losses based on actions that restore, replace, or provide services equivalent to those lost. As evidenced by the restoration alternatives identified in developing this Draft DARP/EA, there are feasible and appropriate opportunities within RRP Program Regions 1 and 2 to restore, replace, or provide services equivalent to those lost due to the Incident. Under

[8] Regional Restoration Planning Program (RRP Program) Regions are defined in Chapter 5 of the Louisiana Regional Restoration Planning Program Final Programmatic Environmental Impact Statement (NOAA et al., 2007).

the no-action alternative, restoration actions needed to make the environment and public whole for its losses would not occur. This is inconsistent with the goals of the natural resource damages provisions of OPA. Thus, the Trustees determined that the no-action alternative (i.e., no compensatory restoration) should be rejected on that basis. The no action/natural recovery alternative is retained in this Draft DARP/EA for comparative purposes only.

4.3.2 Preferred Alternative - Suite of Restoration Actions, including (1) the Woodlands Acquisition, Management and Recreational Enhancement Project, (2) Marsh Creation via a Crevasse Splay, and (3) Recreational Fishing Enhancements

4.3.2.1 Woodlands Acquisition, Management, and Recreational Enhancement Project

The Woodlands Acquisition, Management, and Recreational Enhancement Project involves the acquisition of approximately 650 acres in Plaquemines Parish, Louisiana, along with management and recreational enhancements on the property. The property is located southeast of New Orleans, just south of English Turn and southeast of Algiers (Figure 4.1). The property encompasses contiguous BLH forest and swamp connected to public land owned by the federal government and adjacent to the City of New Orleans Wilderness Park. It is currently owned by Plaquemines Parish and managed by Woodlands Conservancy, a nonprofit land trust organization, under a series of ordinances and Cooperative Endeavor Agreements.

Figure 4.1. Woodlands Acquisition, Management, and Recreational Enhancement Project subject property (approximate boundary mapped in yellow), Plaquemines Parish.

Woodlands Conservancy has managed this property for over a decade, conducting ongoing assessment and restoration activities, engaging schools and interest groups in hands-on service learning, and conducting bird banding research. Through monetary donations, the Woodlands Conservancy has developed hiking trails and an interpretive program and conducted ecosystem restoration work. The land provides essential habitat for wildlife as well as resident and neotropical migratory birds. The BLH forest and swamp provide habitat for eighteen SGCN species listed in Louisiana's Wildlife Action Plan (Holcomb et al. 2015) and nine species of continental importance according to Partners in Flight. It serves as one of the first resting and staging areas for over 100 species of migratory birds prior to their migration across the Gulf. The components of the project are consistent with CPRA's Coastal Forest Conservation Initiative, which seeks to conserve and protect coastal forest resources in

Louisiana. The project also presents a rare opportunity: large coastal forested wetland restoration projects are rare within the hydrologic basin in which the Incident occurred. This area comprises some of the last remaining forested wetlands in Southeastern Louisiana. Habitat on the property acts as a wind barrier for New Orleans and nearby communities and the wetlands on the site serve as a filtering ground for pollution and act as a natural sponge for absorbing storm water runoff. Development of this contiguous forest could change the local hydrology of the area and impact future benefits of this ecosystem.

Plaquemines Parish has considered leasing 250 acres of the tract to a private investor planning to construct a youth baseball facility (including 20 baseball diamonds and 10 to 15 bunkhouses) on the property. Recent appraisals by Woodlands Conservancy and the Parish indicate the cost of purchasing the property at between $1.7 and $3.2 million. Acquisition and protection would ensure that this habitat would continue to provide ecological services and essential habitat for wildlife and migratory birds in perpetuity.

As part of this project, ACL would affect the transfer of title of the property to Woodlands Conservancy. The property would then be protected by a conservation servitude that would remain with the land in perpetuity. Settlement funds received from ACL would be used for habitat and recreational enhancements, such as invasive species management and revegetation of native species, trail enhancements, and creation of new or enhancement of existing signage and/or kiosks that provide interpretive information for public use. Resource management and recreational enhancement would improve habitat services over time and increase passive recreational opportunities. The Trustees believe that this project is cost effective based on the type and quality of trust resources and their services that would be protected and enhanced into the future (e.g., see section 4.4.2). This project also provides the ability to address multiple injury categories in one project, which is not only a direct benefit, but also increases its cost effectiveness.

Restoring the forest habitat within the subject property is anticipated to provide similar or complimentary ecological services to the injured trust resources (shoreline habitat, birds, and recreational use), and therefore, has a sufficient nexus to the injured resources. The project site currently provides recreation opportunities to the New Orleans metropolitan area as well as Plaquemines and St. Bernard Parishes, offers nesting and foraging habitat for resident and migrating birds, and serves as a buffer from wind and storm surge attributed to tropical storms. The Trustees believe effecting the transfer of title to Woodlands Conservancy and legally protecting the trust natural resources and services present on the property will result in a direct benefit because the protected resources and services would no longer be subject to potential development in the future. Habitat enhancements achieved through management of invasive species and replanting of native vegetation would have a positive effect on biodiversity by expanding the available food supply, cover, and sites available for nesting, foraging and mating for birds. The Trustees anticipate developing a Forest Management Plan (FMP) as part of this project to ensure the goals and objectives related to these habitat enhancements are met. The project would be monitored on a regular basis to identify and respond to any potential problems, assess the health and progress of restoration, manage invasive species, and maintain the site for access to planting, treatment, and monitoring locations. These activities may be conducted on foot, utility trail vehicle, or by using a small unmanned aircraft system (sUAS) or “drone.” The

Trustees further anticipate that the project would provide direct recreational enhancements through improvements such as directional signage, information kiosks, trail improvements, educational tools, etc. The protection and enhancements afforded by this project would extend to potential improvement in bird and wildlife viewing and the overall recreational experience for users of the project area.

This project is technically feasible and utilizes proven techniques with established methods, and the Trustees believe the transfer of title of the property to Woodlands Conservancy can be implemented with minimal delay. Acquisition and legal protection are common techniques to protect property from future development while providing the public access to its resources. A title examination conducted by the Trustees found Plaquemines Parish to be vested with valid and merchantable title of the property, and Plaquemines Parish is willing to sell the property for this project. A Phase I Environmental Site Assessment conducted during restoration planning revealed no evidence of recognized environmental conditions on the property, and there are currently no known impediments to acquisition.

The Trustees also foresee no delay in the implementation of proposed restoration and maintenance activities. Woodlands Conservancy has managed the property and would be a partner in the management and protection of the trust resources. All necessary permits or other approvals would be obtained prior to implementation of management activities. Property management would utilize best management practices and ultimately be beneficial in nature (such as exotic/invasive species control); any temporary disturbances would be short-lived with a net gain in resources and services. There may be minimal disturbance in the project area with the installation of educational kiosks and signage, but such disturbance would be temporary and ultimately provide an enhanced visitor experience.

Finally, in evaluating the feasibility of this alternative, the Trustees collaborated with Woodlands Conservancy to determine how to maximize funds in managing the property as a whole. In response, Woodlands Conservancy developed a multi-year plan to manage and restore the property which would leverage funds acquired through the U.S. Department of Transportation's Federal Highway Administration Recreational Trails Program for Louisiana; the Resources and Ecosystems Sustainability, Tourist Opportunities, and Revived Economies of the Gulf Coast States Act; and other funds. By doing so, the Trustees would be able to effect more significant restoration than they would if funding an independent project.

For these reasons, the Trustees have identified the Woodlands Acquisition, Management, and Recreational Enhancement Project as a component of the preferred restoration alternative for this NRDA. In addition to transferring the subject property to Woodlands Conservancy, the Trustees estimate the conservation servitude (habitat protection), and targeted habitat restoration and enhancement and recreational enhancements on the property to cost $640,480.

4.3.2.2 Creation and Enhancement of Coastal Herbaceous Wetlands via Crevasse Splay

To address the injury to aquatic organisms, lost use of restoration material, and aquatic birds, the Trustees are proposing to create at least 9 acres of marsh via a crevasse splay project in the Pass-A-Loutre State Wildlife Management Area (PALWMA) in the Lower Mississippi River (Figure

4.2.). The primary goal of this project would be to provide marsh habitat sufficient to compensate for lost habitat services and for aquatic bird and aquatic faunal injuries. The PALWMA provides both biological and geographic nexus to the injured resources, as well as favorable geomorphic conditions for wetland formation via a crevasse splay to restore injured resources and the opportunity for multiple resource and service benefits. As described in Chapter 3, the extensive loss of coastal marsh within the Lower Mississippi River over the last century has been extensively documented (Boyer et al. 1997; Cahoon et al. 2011).

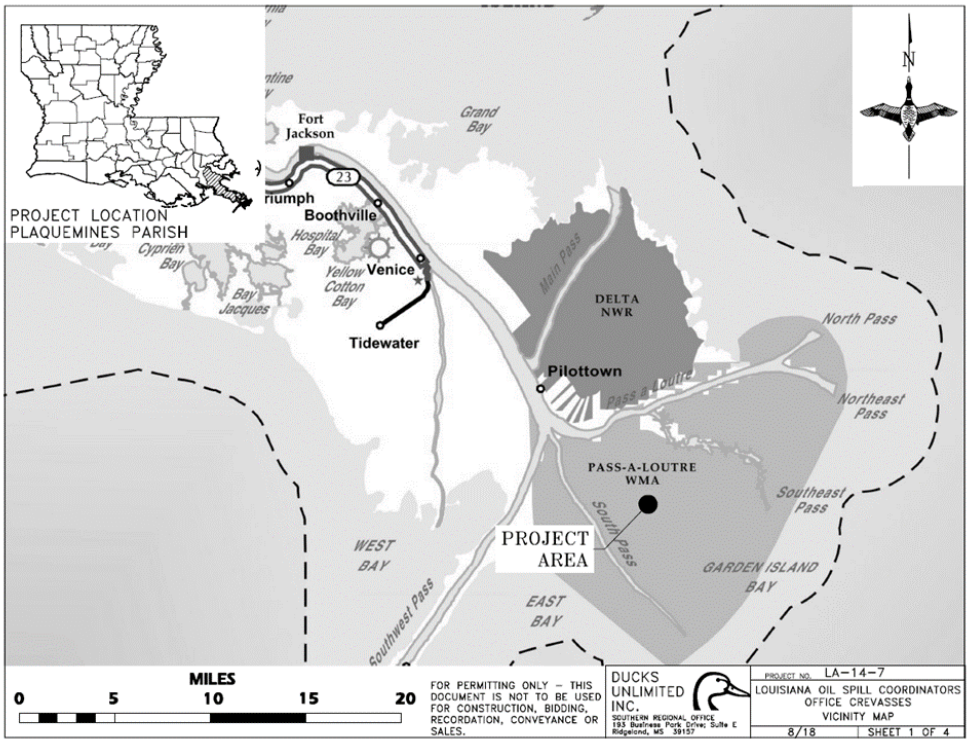

Figure 4.2. Proposed crevasse splay project area, Pass-A-Loutre State Wildlife Management Area.

Numerous factors contributed to the loss of coastal marsh in the Lower Mississippi River, including, but not limited to, the reduction in sediment load from upstream dams, the construction of levees along the river that prevent sediment deposition during normal high water events, and soil subsidence. Constructed crevasses reverse this process by mimicking the historic and natural riverine processes of the Lower Mississippi River by reintroducing riverine sediments during higher river stages. As sediments settle out in the receiving basin, splays are formed. Emergent vegetation forms on the splays and accelerates the land accretion and marsh expansion (Boyer et al. 1997). This project would help facilitate this natural marsh building process.

The proposed crevasse would be a newly constructed feature extending southwest from South Pass and into a marsh area. The new crevasse would measure approximately 750’ in length by 110’ in width and be dredged between 8-12’ in depth. Dredging would be conducted using standard dredging methods, which typically include a bucket-style dredge or hydraulic dredge depending upon site conditions and amount of material to be moved. Dredge locations are not near dry land, so dredges are anticipated to be barge-mounted units. Sediment dredged for the proposed project would be placed on adjacent wetlands just above the tidal elevation to provide nesting habitat for a number of wetland species, such as secretive marsh birds and mottled ducks.

This non-tidal habitat is lacking in this environment and believed to be one reason why the numbers of these wetland birds are in decline. It is important to note that crevasses are created within the WMA on a somewhat routine basis and are typically considered self-mitigating. This type of project is designed to create new wetlands over time. A typical crevasse is designed to create new wetland marsh over a 5- to 40-year life span. The proposed crevasse splay project has a Section 404 Clean Water Act and Section 10 Rivers and Harbors Act permit (Permit No. MVN-2018-01112-MM) and a Coastal Zone Consistency conditional permit (Permit No. C20180143) pursuant to 15 CFR §930.4(a)(1).

Monitoring and evaluation of previous crevasse splay projects has yielded several design considerations that the Trustees utilized in the design of the proposed crevasse splay project. Specifically, the siting, engineering and design: (1) is located on primary order channel of the Lower Mississippi River within the PALWMA, to ensure higher suspended sediment loads for splay marsh creation; (2) has an orientation to the channel that is conducive for intercepting sufficient suspended sediments needed to create a marsh; and (3) has a receiving bay of sufficient size and gradient to create at least 2.2 acres of marsh within 5 years of construction.

Performance monitoring would be performed for 5 years after crevasse construction to provide an assessment of project progress and help guide corrective actions, if any, to meet the project's goals and objectives. The project's success would be determined by comparing quantitative monitoring results to pre-determined performance standards developed by the Trustees defining minimum physical or structural conditions deemed to represent acceptable growth and development. Specific standards of this project are that it would create at least 2.2 new acres of vegetated marsh in the first 5 years, that the crevasse remains open, and that plant species characteristic of splay marshes are present at the end of five years. The final 9 acres would create biomass needed to address the lost sediment use, aquatic faunal, and aquatic bird injury over its lifetime. An aerial photograph taken prior to the cutting of the crevasse would be used to determine the baseline for measurement of future growth of the splay. Aerial photographs would be taken periodically for five years to gauge the progress of the splay development. If the performance criteria are satisfied at the 5-year monitoring event, then the Trustees are confident, based on previous experience, that the project would be successful and no further monitoring would be required.

Should one or more of the performance criteria not be met, corrective action would be considered to remedy the situation. Corrective action options to be considered include: monitoring for an additional period of time to see if the project begins to match predicted trends in growth, re-opening the crevasse, opening a new crevasse, or other actions agreed upon that would correct the deficiency and ensure growth at the required rates.

In this case, a crevasse splay project has a strong nexus to the lost habitat services as well as certain bird and aquatic faunal injuries, benefit multiple resources and resource services, be cost effective, and has a high likelihood of success. For these reasons, the Trustees identified marsh creation via the construction of a crevasse splay in the PALWMA in the Lower Mississippi River as a component of the preferred restoration alternative for this NRDA. The Trustees estimate a crevasse splay project in the PALWMA creating at least 9 acres of marsh would cost $500,000.

4.3.2.3 Recreational Fishing Enhancements

The Trustees estimate total damages of $412,482 for recreational fishing losses due to the Incident. The Trustees propose using settlement funds to restore for lost recreational fishing opportunities by creating or enhancing infrastructure, access, and use opportunities. While the Trustees have not identified a specific restoration project to address this injury at this time, the Trustees are actively engaged in discussing potential opportunities with local and State entities throughout the affected area. Additionally, the Trustees are monitoring other efforts, such as restoration being conducted by the Deepwater Horizon (DWH) NRDA program (e.g., Louisiana Trustee Implementation Group Final Restoration Plan/Environmental Assessment #2: Provide and Enhance Recreational Opportunities (2018)) to be best positioned to select an effective restoration project. When suitable projects are identified, the Trustees will evaluate them under OPA and NEPA prior to proposing it for implementation, and will give notice and an opportunity to comment to the public.

4.4 Considered but Eliminated from Further Evaluation

As discussed in section 4.2, the Trustees evaluated a number of potential projects to help compensate the public for injuries to resources caused by the Incident. Of those, two specific alternatives emerged in addition to the preferred alternative. Both alternatives met the Trustees' restoration goals and criteria; however, due to the reasons discussed below, the Trustees eliminated them from further evaluation and analysis.

4.4.1 Lake Maurepas Land Protection Project

This project included the acquisition and permanent protection of up to 16,000 acres of Louisiana coastal wetlands along the north shore of Lake Maurepas. The project would have provided compensation for coastal forested wetland habitat and fauna that use those habitats. The Lake Maurepas/Maurepas Swamp area supports dense breeding populations of several species of special concern. In addition to these SGCN species, this tract supports numerous other migratory bird species, as well as various terrestrial and aquatic residents. This acquisition would have provided additional public natural resource benefits through storm surge protection, water quality protection/ improvement, and public recreation. However, during the course of the restoration planning process, the Lake Maurepas Land Protection Project was funded by another entity and is therefore no longer available for consideration by the Trustees.

4.4.2 Cash Settlement for Acquisition/Protection of Coastal Forested Wetlands

The Trustees considered developing a cash settlement amount to either purchase or protect and restore other properties in the upper Barataria Basin that also had connectivity to existing swamp habitat. The Trustees would have also required that the property be protected by a perpetual conservation servitude and restoration on the property would have incorporated a combination of re-establishing wet BLH forest, rehabilitating existing BLH forest, and/or preserving existing BLH forest. While land acquisition is technically feasible and associated restoration would use proven techniques with established methods, based on a number of recent land acquisition/land protection projects in the Barataria Basin as a reference, the Trustees estimated that a project

necessary to compensate for the injuries in this case would cost approximately $45,000 per acre, a cost far exceeding the expected cost of the Woodlands Acquisition, Management, and Recreational Enhancement Project. Furthermore, the potential projects the Trustees considered while attempting to develop a cash settlement number for this purpose do not remain current restoration options, having been implemented for other purposes during the course of the Trustees' planning process. Additionally, those projects did not have the public access and recreational use opportunities found with the Woodlands Acquisition, Management, and Recreational Enhancement Project.

4.5 Conclusion

As part of the cooperative assessment and restoration planning process, the Trustees evaluated expected restoration benefits of potential restoration actions to identify a preferred restoration alternative. Based on the above information and analysis, the Trustees propose the following suite of restoration actions as the preferred restoration alternative to fully compensate the public for the natural resources and services injured as a result of the Incident. Natural resources and resource services injured by the Incident and the Trustees' preferred restoration types and actions to compensate for the injured resource or service are summarized in Table 4.2.

1. Implement the *Woodlands Acquisition, Management, and Recreational Enhancement Project* as discussed in Section 4.3.2.1. This project would provide for the acquisition and legal protection of approximately 650-acres of contiguous coastal forested wetland habitat, predominately BLH forest and Bald Cypress/Tupelo Swamp, in Plaquemines Parish, Louisiana, ensuring that ecological, bird and wildlife, and recreational services continue into the future. Settlement funds received from ACL would also go towards habitat enhancements on the property, such as invasive species management and revegetation of native species, to improve the ecological and biological productivity of the habitat, as well as recreation enhancements, such as trail enhancements, and creation of new or enhancement of existing signage and/or kiosks providing interpretive information for public use on area wildlife and vegetation.
2. Construction of a crevasse splay project in the PALWMA in the Lower Mississippi River as described in Section 4.3.2.2.
3. Cash settlement in the amount of $548,845 to fund recreational enhancement projects to restore for Riverfront use and recreational fishing injuries as described in Sections 4.3.2.1 and 4.3.2.3. A future restoration plan or plans identifying specific recreational fishing enhancement projects would be issued by the Trustees for public review following settlement with ACL.

Table 4.2. Preferred restoration types based on injured natural resources and their services and the Trustees' preferred restoration actions.

Injured Resources/Services	Preferred Restoration Types	Proposed Restoration Actions
Shoreline Habitats		
Batture	• Acquisition/Legal Protection of Coastal Forested Wetlands	Woodlands Acquisition, Management, and Recreational
Riprap		

	• Creation/Enhancement of Coastal Forested Wetlands	Enhancement Project (see Section 4.3.2.1)
Aquatic Fauna	Creation/Enhancement of Coastal Herbaceous Wetlands	Creation and Enhancement of Coastal Herbaceous Wetlands via Crevasse Splay (see Section 4.3.2.2)
Sediment for Restoration Projects	Creation/Enhancement of Coastal Herbaceous Wetlands	Creation and Enhancement of Coastal Herbaceous Wetlands via Crevasse Splay (see Section 4.3.2.2)
Birds		
Aquatic	Creation/Enhancement of Coastal Herbaceous Wetlands	Creation and Enhancement of Coastal Herbaceous Wetlands via Crevasse Splay (see Section 4.3.2.2)
Terrestrial	• Acquisition/Legal Protection of Coastal Forested Wetlands • Creation/Enhancement of Coastal Forested Wetlands	Woodlands Acquisition, Management, and Recreational Enhancement Project (see Section 4.3.2.1)
Human Use		
Recreational Fishing	• Restore Recreational Resource Services (fishing) • Restore Recreational Resource Services (riverfront use)	• Fishing: increased access to or enhanced recreational fishing opportunities in the affected region (see Section 4.3.2.3). • Riverfront Use: Woodlands Acquisition, Management, and Recreational Enhancement Project (see Section 4.3.2.1)
Riverfront Use		

5 POTENTIAL ENVIRONMENTAL IMPACTS OF UNDERTAKING THE PREFERRED RESTORATION ACTIONS

NEPA requires that the environmental impacts of a proposed federal action be considered before implementation (42 U.S.C. §4321; 40 C.F.R. Parts 1500-1508). This section addresses the potential environmental consequences of the Trustees' proposed restoration actions. Generally, when it is uncertain whether an action would have a significant impact, federal agencies would begin the NEPA planning process by preparing an environmental assessment (EA). Federal agencies may then review public comments prior to making a final determination. Depending on whether an impact is considered significant, an environmental impact statement (EIS) or a Finding of No Significant Impact would be issued.

In undertaking their NEPA analysis, the Trustees evaluated the potential significance of proposed actions, considering both context and intensity (40 C.F.R. § 1508.27). For the actions considered in this Draft DARP/EA, the appropriate context for considering potential significance of the action is at the local or regional level, as opposed to national, or worldwide. Intensity refers to the severity of impact. This Draft DARP/EA, in its entirety, is intended to accomplish NEPA compliance by summarizing the current environmental setting of the proposed restoration, describing the purpose and need for restoration actions, identifying alternative actions, assessing the environmental consequences of the proposed action(s), and providing an opportunity for public participation in the decision-making process.

The Trustees evaluated the potential for restoration actions associated with all proposed alternatives to impact the following: the physical environment (air and noise pollution and water quality), the biological environment (vegetation, fisheries, wildlife and endangered species), socioeconomic environment (environmental justice, recreation, and cultural resources) and the potential for cumulative impacts.

The proposed restoration actions included in this Draft DARP/EA (Table 4.2) will enhance the functionality of the ecosystem in the area impacted by the Incident by preserving and improving coastal wetland forests, improving aquatic habitat and water quality, restoring native species, and providing enhanced opportunities for human recreational use.

After considering NEPA requirements, the Trustees believe that the proposed restoration actions described in this Draft DARP/EA will not cause significant negative impacts to the environment or to natural resources or the services they provide. None of the proposed actions to be implemented by the Trustees are controversial, have highly uncertain impacts or risks, or are likely to violate any environmental protection laws. Further, the Trustees do not believe the proposed actions will adversely affect the quality of the human environment or pose any significant adverse environmental impacts. Instead, habitat restoration will benefit aquatic fauna and birds by restoring natural habitat functions. Likewise, the proposed restoration actions will provide positive benefits for human recreational use.

As described in Chapter 4, the Trustees would restore lost recreational fishing opportunities by creating or enhancing infrastructure, access, and use opportunities. While the Trustees have not identified a specific restoration project to address this injury at this time, the Trustees are actively

engaged in discussing potential opportunities with local, State and federal entities throughout the affected area. When the Trustees identify a potential suitable project or project(s), notice will be given to the public and the Trustees will evaluate the project under OPA and NEPA prior to proposing it for implementation.

A summary of the Trustees' analysis is located below.

5.1 Physical Environment

5.1.1 Air and Noise Pollution

No Action: Air quality conditions would remain as they are, and there would be no adverse impacts to air quality from construction activities. There would be no noise above the ambient levels because there would be no construction activities associated with no action.

Preferred Alternative: Numerous crevasse splays have been created in the Lower Mississippi River, thereby assisting the Trustees' understanding of environmental impacts associated with the construction of crevasse splays. Machinery and equipment used during the construction of the crevasse is expected to increase noise in the near proximity of construction but is anticipated to be less than 2 working days. During construction, the increase in noise could disturb wildlife and humans use near the construction site. However, given the short duration of the earth moving work needed to create a crevasse, the increase noise and potential air emissions are considered de minimus and the site would return to present levels immediately after construction.

The restoration actions for the Woodlands Acquisition, Management, and Recreational Enhancement Project (hereafter "Woodlands project") would likely entail the use of smaller equipment (e.g., augers for tree planting) and the use of vehicles to transport vegetation and trail maintenance equipment in and out of the site. These actions would not produce adverse impacts to noise and air pollution.

5.1.2 Water Quality

No action: There would be no short-term adverse impacts to water quality associated with construction with no action. However, not implementing the crevasse splay action would not restore coastal marsh that has been converted to open water through land loss from subsidence and/or erosion and, therefore, long-term benefits to water quality such as nutrient reduction would not occur.

Preferred Alternative: Impacts resulting from habitat improvements at the Woodlands project may have temporary, minor adverse impacts to local ambient surface water and sediment quality by disrupting topsoil conditions during mechanical removal and by herbicides becoming airborne or washed into local drainages by rainfall events. Trustees would ensure that best management practices (e.g., appropriate equipment, tire pressure, dry weather conditions, targeted herbicide application, etc.) would be implemented to guarantee minimal topsoil disturbance and minimal airborne and rainfall drift of herbicides to local drainages to avoid effects to local water and sediment quality.

The crevasse splay action would entail the use of heavy equipment to breach a natural levee to intercept certain river stage heights. There may be a short-term, adverse impacts to water quality from increases in localized suspended sediment associated with the work. Best management practices and compliance with applicable permits would be employed to minimize the extent, duration, and intensity of any water quality impacts. Post construction, water quality should stabilize, and there should be moderate beneficial, long-term impacts to water quality because of improved benthic habitat. Additionally, because constructed crevasses mimic the historic and natural riverine processes by reintroducing alluvial sediments during higher river stages, the current shallow open water areas (i.e. receiving basin) would experience short-term, episodic increases in suspended sediment associated with higher river stage heights. As alluvial sediments settle out in the receiving basin, the shallow water areas will gradually convert to marsh through the creation of splays. Emergent vegetation is expected to naturally recruit on the splays and further facilitate the expansion of marsh through enhanced sediment trapping. Because of this natural process of creating marsh, the Trustees do not anticipate any long-term adverse impacts associated with the construction or maintenance of the crevasse splay.

5.2 Biological Environment

5.2.1 Vegetation

No Action: The Woodlands project area consists of BLH forest (wet and non-wet) and cypress swamp which are functioning as a contiguous forest ecosystem along the Mississippi River east of New Orleans. The BLH forest canopy is dominated by red maple, American elm, bald cypress, and tupelo gum, and sparsely contains various water-tolerant oak species in the mid- and understory. Past hurricane damage affected most oak species in the canopy. Midstory species include box elder, swamp privet, and persimmon. Understory species include blackberry, dewberry, English ivy, stinging nettle, and various asters and clover. The swamp canopy is dominated by bald cypress and red maple, with black willow dominating the midstory, and alligator weed, southern naiad, and cut grass dominating the understory. Chinese tallow, an aggressive invasive species, is present at the project site. Without active management (e.g., manual removal or herbicide treatment) there would be long-term adverse impacts to native vegetation, as Chinese tallow would reasonably be expected to outcompete the native vegetation, reducing the biological value of the project site.

The crevasse splay action would be located in an area that is dominated by open water and, therefore, the no action would not enhance or impact vegetation.

Preferred Alternative: The Woodlands project would restore and maintain the BLH forest through a number of passive and active restoration actions (e.g. preservation and treatment of invasive species). Standard best management practices and techniques for invasive species management and replanting native tree species would be used to implement forest enhancement measures. Such techniques may include mechanical removal, herbicide treatment of invasive plant species using certified applicators and approved herbicides for wetland habitats, or a combination of both techniques. The selection and application rates for herbicide use for invasive species control will be designed to maximize control of the invasive species and minimize harm

to native vegetation. Some short-term adverse impacts to existing native vegetation may occur during herbicide application, but such effects will be minimized to the maximum extent practicable because only targeted plant species will be treated.

The proposed crevasse splay action would create herbaceous wetlands through the deposition of alluvial sediments. Emergent vegetation would form on the splay and accelerates the land accretion and marsh expansion.

Through the implementation of the preferred restoration actions, long-term beneficial impacts to vegetation at the Woodlands project site and PALWMA would occur.

5.2.2 Aquatic Habitat

No Action: The no action alternative would not restore for injured resources or result in the creation and enhancement of aquatic habitat through the proposed crevasse splay that would support all or a portion of the lifecycles of plants, benthic invertebrates, fish, other aquatic organisms, birds, and mammals.

Preferred Alternative: The proposed crevasse splay action would create herbaceous wetlands through the deposition of alluvial sediments. Emergent vegetation would form on the splay and accelerates the land accretion and marsh expansion. The functional value of herbaceous wetlands (i.e. marsh) is well documented in the scientific literature to have a positive effect on aquatic habitat improving the estuarine food web (e.g., essential role in primary, secondary and tertiary productivity).

5.2.3 Fisheries and EFH

No Action: With no action, there would be long-term adverse impacts to fisheries and EFH, as productivity improvements needed to restore for injured resources resulting from the Incident would not be implemented.

Preferred Alternative: The Woodlands project would have localized beneficial impacts to freshwater fisheries within the canals around the property by maintaining and improving riparian vegetation.

The construction of a crevasse is intended to trap suspended sediment within the splay, which will in turn increase the elevation to become suitable for the natural recruitment of marsh vegetation. The functional value of herbaceous wetlands (i.e. marsh) is well documented in the scientific literature to have a positive effect on water and sediment quality (e.g., increased water filtration and sediment suitable for a variety of benthic invertebrates), as well as improving the estuarine food web. The crevasse restoration action would provide valuable habitat, including EFH, that support a diverse assemblage of estuarine-dependent fishes, shell-fishes and EFH species by providing marsh edges and forage for a variety of fish and wildlife. Example fisheries species that would benefit from the crevasse splay action are red drum, blue crab, brown shrimp and white shrimp. Therefore, the crevasse splay action is expected to result in long-term beneficial impacts to fisheries in the project area.

5.2.4 Wildlife

No Action: With no action, there would be long-term adverse impacts to wildlife, as productivity improvements needed to restore for injured resources resulting from the Incident would not be implemented.

Preferred Alternative: Machinery and equipment used during construction of the crevasse splay at the PALWMA and Woodlands project (e.g., trail improvements) could temporarily disturb wildlife near the construction activity. Adverse impacts on mobile species (e.g., birds, mammals) are expected to be minor, consisting of short-term displacement. Overall, the proposed land acquisition and habitat improvements are expected to provide long-term beneficial impacts to wildlife through enhancement and protection of their habitat.

5.2.5 Endangered and Threatened Species

No Action: No action would not result in beneficial or adverse impacts to species listed as endangered or threatened under the Endangered Species Act (16 U.S.C. § 1531 et seq.).

Preferred Alternative:
Pursuant to the Endangered Species Act (16 U.S.C. § 1531 et seq.), the Trustees reviewed and coordinated with NOAA and the FWS to determine the potential presence of listed species (see the Federally-listed species listed in Table 2.3). Through informal consultation, NOAA concurred that the proposed restoration actions associated with the creation of a crevasse splay are not likely to adversely affect or impact the following species: the terrestrial and marine life stages of the hawksbill, Kemp's ridley, leatherback and loggerhead sea turtles. This is based on numerous years of similar restoration implementation and monitoring that have not encountered these species and the determination that site conditions have not changed in a material manner that would provide suitable nesting habitat for all the sea turtle in the action area. While the species of sea turtles are known to use large channels along the Gulf of Mexico, they are not likely to be present in the South Pass or emergent marsh of the proposed restoration action area. The proposed restoration project activities will involve the use of a floating bucket dredge to create a crevasse. Dredging activities within the proposed restoration project action area could result in temporary increases in turbidity, the turbidity would be within the open water and emergent marsh targeted for restoration. Construction noise would also be localized and temporary. South Pass (proposed restoration project action area) does not harbor extensive sea grass beds that may be used as foraging habitats, thus foraging habitat loss is not an expected impact. In order to ensure de minimis impacts, BMPs would be implemented to minimize and avoid any potential impacts within the proposed restoration project action area. The Trustees will consult with the FWS on potential effects to these species from proposed actions, as applicable. Consultations will also be completed for all future recreational use restoration not fully evaluated as part of this DARP/EA.

5.3 Socioeconomic Environment

5.3.1 Environmental Justice

No Action: No action would not provide long-term beneficial impacts to the public from land acquisition, improved habitat and recreational opportunities. Additionally, the lack of meaningful recovery would have indirect, adverse impacts on the economic and social well-being of area residents.

Preferred Alternative: The restoration actions would not negatively or disproportionately affect minority or low-income populations in the area, including economically, socially, or in terms of conditions affecting their health. There would be long-term, indirect, beneficial impacts because proposed activities are expected to preserve and restore an environment that is of equal benefit to all area residents and provide improved recreational opportunities.

5.3.2 Recreation

No Action: No action would not restore for injured recreational resources lost as a result of the incident and would not provide long-term benefits to the region.

Preferred Alternative: Land acquisition, habitat improvements, and recreational use enhancements would ensure existing natural resource services and recreational and aesthetic values are conserved and available into the future. Invasive species management, planting, and recreational use improvements could have temporary adverse effects to the aesthetic and recreational qualities and values during active management activities due to the presence of equipment or personnel performing management activities or installing recreational features. Over time, public access and recreational opportunities would be enhanced as a result of those activities. Beneficial impacts would result from invasive species management activities that contribute to the restoration or enhancement of the Woodlands project. Such effects would extend to potential improvement in bird and wildlife viewing, hiking, and biking opportunities, and the overall recreational experience for users of the restored habitat. The invasive species management activities may also result in expanding or reopening areas with high aesthetic and recreational qualities to the public. Accordingly, implementation of site improvements would result in temporary adverse effects but would have long-term beneficial impacts to aesthetic and recreational qualities or values at the project site.

Enhancements to recreation services through improvements and/or installation of signage or kiosks would result in temporary, localized, minor adverse impacts from ground disturbance at the Woodlands project. The disturbed sites would be re-contoured similar to the surrounding surface conditions following enhancement activities and allowed to naturally revegetate. The restoration actions would increase and enhance recreational use and, therefore, would reasonably be expected to improve and provide beneficial impacts to recreation.

Habitat improvements associated with the creation of a crevasse splay restoration action in the PALWMA are expected to have a short-term adverse impact on recreation, namely fishing, in the near proximity of construction. Given the vast size of the PALWMA, the small size of the

anticipated construction and ample fishing opportunities, the Trustees do not anticipate more than minor adverse impacts to recreation associated with the construction of the crevasse. There are no anticipated impacts to public access of the levees that would be breached during construction, as access to the levees is by boat only. Recreational fishing could reasonably be expected to improve in the proximity of the crevasse splay as the marsh forms and begins to properly function. Specifically, the marsh is expected to improve productivity and access for fish, both of which could beneficially impact recreation by enhancing recreational fishing opportunities.

The Trustees will also continue to review and plan restoration projects to provide recreational fishing opportunities. Such projects would directly benefit the public by providing or enhancing recreational fishing opportunities.

5.3.3 Cultural resources

No Action: Under this alternative, there would be no impacts because any potentially present cultural and historic resources would remain as they currently stand.

Preferred Alternative: The Louisiana Department of Culture, Recreation and Tourism maintains catalogues of cultural resource sites, but many areas remain unsurveyed and the significance or eligibility of some sites for inclusion in the National Register of Historic Places has not been determined. The Trustees will consult with the Louisiana State Historic Preservation Office on potential effects to archaeological sites, as applicable. Consultations will also be completed for all future recreational use restoration not fully evaluated as part of this DARP/EA.

5.4 Cumulative Impacts

Under NEPA, federal agencies are required to consider the cumulative effects of their proposed actions within the affected environment. Cumulative impacts are the collective result of the incremental impacts of an action that, when added to the impacts of other past, present, and reasonably foreseeable future actions, would affect the same resources, regardless of what agency or person undertakes those actions. Cumulative impacts can result from individually minor but collectively significant actions taking place over a period of time (40 C.F.R. § 1508.7). Although the impacts of individual actions taken separately might be minor, the impact of those same actions taken together may be significant for one or multiple resources.

A cumulative impacts analysis focuses on the resources rather than the planned action and considers impacts that take place on both spatial and temporal scales. On a spatial basis, impacts must be considered both within and outside the proposed project area. Time scales for a cumulative impacts analysis are generally longer than project-specific analysis of impacts.

The Trustees have reviewed potential past, present, and reasonably foreseeable actions to assess the potential for cumulative impacts. In this Draft DARP/EA, the Federal Trustees considered the potential cumulative impacts of both the No-Action Alternative and the Preferred Alternative in light of restoration planning efforts and opportunities in the region.

5.4.1 No Action

Since no active restoration would occur, the no action alternative would have long-term adverse effects to physical, biological, and socioeconomic resources in the lower Mississippi River, its associated shoreline habitats, and emergent wetlands of the Bird's Foot Delta in Plaquemines and St. Bernard Parishes, Louisiana. Natural resources would not return to baseline and interim losses would not be compensated for. However, the adverse cumulative effect of the no-action alternative would be minor and not at a regional scale, and is not expected to be significant as defined under NEPA.

5.4.2 Preferred Alternative

The preferred restoration actions taken together will be cumulative in the sense that protection of the Woodlands project property in perpetuity and associated habitat and recreational improvement and management, along with the creation and enhancement of coastal wetlands via crevasse splay, will provide ecological and human use services into the future. These restoration actions are intended to compensate the public for resources injuries caused by the Incident. Based on the environmental analysis conducted herein, the Trustees do not anticipate any negative cumulative impacts as a result of implementing the preferred alternative.

The restoration actions under the preferred alternative would have no major adverse impacts on physical, biological, and socioeconomic resources in the project area. The preferred alternative may result in minor, short-term adverse impacts and both short- and long-term beneficial impacts to habitats and the natural resources they support. When considered in tandem with other past, present, and reasonable foreseeable future actions in the lower Mississippi River and the Bird's Foot Delta, the preferred alternatives are not anticipated to have adverse cumulative impacts. The preferred alternative is expected to result in long-term, beneficial cumulative impacts on the human environment resulting from synergy with previous and current restoration efforts, as well as future restoration activities in the vicinity constructed under separate federal and state authorities and by local and private entities. These efforts may positively impact the areas land use, recreational use, and economic activity through habitat restoration, land preservation, and improved public access and recreational activities. These beneficial cumulative impacts are not expected to be significant as defined under NEPA

5.5 Preliminary Finding of No Significant Impact

Under 40 C.F.R. §§ 1501.5 and 1501.6, for the purposes of this NEPA analysis, the DOI is the lead agency and NOAA is a cooperating agency. Based on the analysis of the available information presented in this document, the federal Trustees have preliminarily concluded that implementation of the preferred restoration actions, as proposed herein, would not significantly impact the quality of the human environment. All potential beneficial and adverse impacts have been considered in reaching this conclusion. Unless information indicating the potential for significant impacts is revealed through the public review and comment process on this Draft DARP/EA, an Environmental Impact Statement (EIS) will not be prepared for the proposed restoration action. Issuance of a Finding of No Significant Impact based upon this Draft

Environmental Assessment would fulfill and conclude all requirements for compliance with NEPA by the federal Trustees.

6 COMPLIANCE WITH OTHER AUTHORITIES

Federal Laws

Additional federal laws may apply to the preferred alternative considered in this Draft DARP/EA. All federal, state and local laws will be complied with prior to project implementation. Federal laws, regulations, and Executive Orders (EO) that may be applicable include, but are not limited to, the following:

- Endangered Species Act (16 U.S.C. § 1531 et seq.)
- Magnuson-Stevens Fishery Conservation and Management Act (16 U.S.C. § 1801 et seq.)
- Marine Mammal Protection Act (16 U.S.C. § 1361 et seq.)
- Coastal Zone Management Act (16 U.S.C. § 1451 et seq.)
- National Historic Preservation Act (16 U.S.C. § 470 et seq.)
- Migratory Bird Treaty Act (16 U.S.C. § 703 et seq.)
- Bald and Gold Eagle Protection Act (16 U.S.C. § 668 et seq.)
- Clean Air Act (42 U.S.C. § 7401 et seq.)
- Federal Water Pollution Control Act (Clean Water Act) (33 U.S.C. § 1251 et seq.) and/or Rivers and Harbors Act (33 U.S.C. § 401 et seq.)
- Marine Protection, Research and Sanctuaries Act (16 U.S.C. § 1431 et seq. and 33 U.S.C. § 1401 et seq.)
- Estuary Protection Act (16 U.S.C. § 1221–1226)
- Archaeological Resource Protection Act (16 U.S.C. § 470aa–470mm)
- National Marine Sanctuaries Act (16 U.S.C. § 1431 et seq.)
- Farmland Protection Policy Act (7 U.S.C. § 4201–4209)
- Rivers and Harbors Act (33 U.S.C. § 401 et seq.) EO 11988: Floodplain Management (augmented by EO 13690, January 30, 2015)
- EO 11990: Protection of Wetlands
- EO 12898: Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations[9]
- EO 12962: Recreational Fisheries
- EO 13007: Indian Sacred Sites
- EO 13112: Safeguarding the Nation from the Impacts of Invasive Species
- EO 13175: Consultation and Coordination with Indian Tribal Governments
- EO 13186: Responsibilities of Federal Agencies to Protect Migratory Birds
- EO 13693: Planning for Federal Sustainability in the Next Decade

[9] This order requires each federal agency to identify and address, as appropriate, disproportionately high and adverse human health or environmental effects of its programs, policies, and activities on minority and low-income populations. The proposed projects are not expected to adversely affect the environment or human health for any environmental justice populations in the vicinity of the projects. In January 2021, the Executive Branch of the United States issued additional Executive Orders relating to Environmental Justice. The federal Trustees reviewed the proposed projects in the context of these Executive Orders and confirm that the proposed projects are not expected to result in disproportionately high or adverse human health, environmental, climate-related or other cumulative impacts on disadvantaged communities.

State and Local Laws

The Trustees would ensure compliance with all applicable state and local laws relevant to the State of Louisiana. Applicable laws and regulations may include, but are not limited to, the following:

- Archeological Finds on State Lands (RS 41:1605)
- Louisiana State and Local Coastal Resources Management Act (RS 49:214.21–214.42)
- Louisiana Oil Spill Prevention and Response Act (RS 30:2451 et seq.)
- Management of State Lands (RS 41:1701.1 et seq.)
- Louisiana Coastal Resources Program (LAC 43:700 et seq.)
- Louisiana Surface Water Quality Standards (LAC 33.IX, Chapter 11)
- Oyster Lease Relocation Program (LAC 76: VII, Section 531)
- Louisiana Scenic Rivers Program (RS 56:1856)

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APPENDIX A: POTENTIAL RESTORATION ACTIONS IN RRP Program REGIONS 1 AND 2

Count	Project ID	Project Name	Parish	RRP Program Region
1	225	Edward Wisner Marsh Creation	Lafourche	2
2	229	Wetland Creation-Parishwide | East Bank	St James	1
3	230	Grand Point Boat Launch	St James	1
4	233	Wetland Creation-Parishwide | West Bank	St James	2
5	245	Bay Champagne Marsh Creation|North Rim	Lafourche	2
6	246	Martin Shoreline Protection and Marsh Creation	Lafourche	2
7	261	Woodlands Acquisition, Management and Recreational Enhancement Project	Plaquemines	2
8	262	The Coastal Forest Center	Orleans	2
9	264	Woodlands Trail - Interpretive Center	Plaquemines	2
10	300	West End Cypress Swamp Project - Mandeville, LA	St Tammany	1
11	320	Clovelly	Lafourche	2
12	323	Restoring a Small Island in Barataria Bay: Providing Habitat for Nesting Birds	Plaquemines	2
13	373	La Branche East Marsh Creation (PO-0075)	St Charles	1
14	480	LL&E South Lafourche Marsh Restoration and Levee Protection	Lafourche	2
15	482	EKOgrownÂ® Native Trees for Barrier Islands Restoration	Coastwide	Coastwide
16	484	Twin Pipeline Canal Ridge Restoration and Fringe Marsh Creation	Lafourche, Terrebonne	2, 3
17	493	PPL20 - Lake Lery Marsh Restoration	St Bernard	1, 2
18	495	Lake Maurepas Land Protection Effort	Livingston, Tangipahoa	1
19	500	Grand Isle and Vicinity Barrier Islands Protection and Enhancement	Jefferson, Lafourche	2, 3
20	501	Lake Pontchartrain Shoreline Restoration - Little Woods area	Jefferson, Orleans, St Tammany, Tangipahoa	1
21	502	Lake Pontchartrain Shoreline Restoration - South Shore	Jefferson, Orleans, St Tammany, Tangipahoa	1

22	503	Lake Pontchartrain Shoreline Restoration - canal restoration	Jefferson, Orleans, St Tammany,	1
23	566	Madisonville to Manchac Louisiana Wetlands Redux	Tangipahoa Coastwide	Coastwide
24	572	Delacroix Island Protection and Restoration: A Hurricane Protection and Community Resilience Project	St Bernard	2
25	577	Restore historic Gulf Sturgeon spawning grounds	St Tammany	1, 5
26	608	Big Branch Marsh National Wildlife Refuge	St Tammany	1
27	622	Chef Menteur Restoration	Orleans	1
28	752	Mississippi River long distance sediment pipeline/marsh creation - NRDA increment	Plaquemines	2
29	803	Tchefuncte River Lighthouse Habitat Restoration & Shoreline Protection	St Tammany	1
30	811	Barataria Basin Ridge and Marsh Creation Project: Spanish Pass Increment (BA-0203)	Plaquemines	2
31	813	Caminada Headlands Back Barrier Marsh Creation Increment 2 (BA-0193)	Lafourche, Jefferson	2
32	814	East Leeville Marsh Creation and Nourishment (BA-0194)	Lafourche	2
33	815	Barataria Bay Rim Marsh Creation and Nourishment (BA-0195)	Jefferson, Plaquemines	2
34	816	LaBranche East Marsh Creation (PO-0075)	St Charles	2
35	817	LaBranche Central Marsh Creation (PO-0133)	St Charles	2
36	818	New Orleans Landbridge Shoreline Stabilization and Marsh Creation (PO-0169)	Orleans	1
37	819	Fritchie Marsh Terracing and Marsh Creation (PO-0173)	St Tammany	1
38	820	Bayou La Loutre Ridge Restoration and Marsh Creation (PO-0178)	St Bernard	1
39	821	St. Catherine Island Marsh Creation and Shoreline Protection (PO-179)	Orleans	1
40	822	North Catfish Lake Marsh Creation (TE-0112)	Lafourche	2
41	826	Caminada Headlands Back Barrier Marsh Creation (BA-0171)	Lafourche	2
42	827	Bayou Grand Cheniere Marsh and Ridge Restoration (BA-0173)	Plaquemines	2

43	828	Terracing and Marsh Creation South of Big Mar (BS-0024)	Plaquemines	2
44	829	Shell Beach South Marsh Creation (PO-0168)	St Bernard	1
45	865	Alligator Bend Marsh Restoration and Shoreline Protection (PO-0034)	Orleans	1