Louisiana Trustee Implementation Group

Strategic Restoration Plan and Environmental Assessment #3:

Restoration of Wetlands, Coastal, and Nearshore Habitats in the Barataria Basin, Louisiana

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Acronyms and Abbreviations

BICM	Barrier Island Comprehensive Monitoring
BLM	Bureau of Land Management
BP	BP Exploration and Production Inc.
BSE	bay, sound, estuary
CFR	Code of Federal Regulations
cfs	cubic feet per second
CHl α	Chlorophyll *a*
CMP	Coastal Master Plan
CPRA	Coastal Protection and Restoration Authority
CWPPRA	Coastal Wetlands Planning, Protection and Restoration Act
DOC	United States Department of Commerce
DOI	United States Department of the Interior
DWH oil spill	*Deepwater Horizon* oil spill and associated response efforts
EIS	Environmental Impact Statement
EO	Executive Order
EPA	Environmental Protection Agency
ESA	Endangered Species Act
EwE	Ecopath with Ecosim and Ecospace
FR	Federal Register
FWOA	future without action
GCERC	Gulf Coast Ecosystem Restoration Council
GEBF	Gulf Environmental Benefit Fund
GMeC	Gulf MetaCode
HSIs	Habitat Suitability Indices
LA TIG	Louisiana Trustee Implementation Group
LCA	Louisiana Coastal Area
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
LOSPRA	Louisiana Oil Spill Prevention and Response Act
MAM	monitoring and adaptive management
MBSD	Mid-Barataria Sediment Diversion
MOA	Memorandum of Agreement

MRHDMS	Mississippi River Hydrodynamic and Delta Management Study
NEPA	National Environmental Policy Act
NFWF	National Fish and Wildlife Foundation
NOAA	National Oceanic and Atmospheric Administration
NOA	Notice of Availability
NOI	Notice of Intent
NOS	Notices of Solicitation
NPS	National Park Service
NRDA	Natural Resource Damage Assessment
O+M	Operations and Maintenance
OPA	Oil Pollution Act of 1990
PDARP/PEIS	Programmatic Damage Assessment and Restoration Plan/Programmatic Environmental Impact Statement
PRNP	Pearl River Navigation Project
RESTORE Act	Resources and Ecosystems Sustainability, Tourist Opportunities, and Revived Economies of the Gulf Coast States Act
RM	river mile
ROD	Record of Decision
SAV	submerged aquatic vegetation
SOPs	standard operating procedures
SRP/EA	Louisiana Trustee Implementation Group Strategic Restoration Plan and Environmental Assessment #3: Restoration of Wetlands, Coastal, and Nearshore Habitats in the Barataria Basin, Louisiana
SWAMP	System-Wide Assessment and Monitoring Program
Trustee Council SOP	Trustee Council Standard Operating Procedures
USACE	Unites States Army Corps of Engineers
USDA	United States Department of Agriculture
USFWS	United States Fish and Wildlife Service

Executive Summary

The Louisiana Trustee Implementation Group (LA TIG) is responsible for restoring the natural resources and services within the Louisiana Restoration Area that were injured by the *Deepwater Horizon* oil spill (DWH oil spill). The purpose of restoration, as discussed in this document and detailed more fully in the Programmatic Damage Assessment and Restoration Plan/Programmatic Environmental Impact Statement (PDARP/PEIS), is to make the environment and the public whole for injuries resulting from the DWH oil spill by implementing restoration actions intended to return injured natural resources and services to baseline conditions and compensate for interim losses, in accordance with the Oil Pollution Act of 1990 (OPA) and associated Natural Resource Damage Assessment (NRDA) regulations.[1] The LA TIG has prepared this "Louisiana Trustee Implementation Group Strategic Restoration Plan and Environmental Assessment #3: Restoration of Wetlands, Coastal, and Nearshore Habitats in the Barataria Basin, Louisiana" (SRP/EA) in order to identify a restoration strategy that will help prioritize future decisions regarding project selection and funding. This integrated SRP/EA will also ensure compliance with the National Environmental Policy Act (NEPA) by incorporating information included in the PDARP/PEIS, where appropriate, to evaluate and compare environmental impacts of considered alternatives.

In this SRP/EA, rather than selecting specific projects for construction, the Trustees of the LA TIG (also referred to here interchangeably as "the LA TIG" or "the Trustees") evaluate a suite of restoration techniques and approaches, for example large-scale diversions or marsh creation, to determine how to best support restoring ecosystem-level injuries in the Gulf of Mexico through restoration in the Barataria Basin. This strategic approach to restoration will allow the Trustees to prioritize projects for further evaluation by the LA TIG. Thus, the Trustees are making two decisions in this SRP/EA. First, after evaluating a reasonable range of alternatives, the Trustees have selected a preferred alternative that relies on a suite of restoration approaches and techniques in the Barataria Basin, including large-scale sediment diversions to restore deltaic processes, marsh creation, and ridge restoration. This preferred alternative recognizes that a large-scale sediment diversion in the Barataria Basin likely would provide benefits to the ecosystem that cannot be realized by any other technique or suite of techniques – for example, one that relies on large-scale marsh creation without a diversion. Second, the Trustees select to advance several projects forward for further evaluation and planning: the Mid-Barataria Sediment Diversion and one marsh creation increment within Large Scale Marsh Creation - Component E in Barataria Basin. In this Plan, the Trustees also confirm that their 2017 decision to move the Spanish Pass Increment of the Barataria Basin Ridge and Marsh Creation project forward for further evaluation and planning (Louisiana TIG, 2017) is consistent with the

[1] The Final PDARP/PEIS and Record of Decision (ROD) can be found at http://www.gulfspillrestoration.noaa.gov/restoration-planning/gulfplan/.

preferred alternative proposed here. These two decisions: selecting the preferred alternative and moving forward with restoration planning and NEPA review for the projects identified above are collectively referred to as the "Proposed Action." The Trustees are not proposing these projects for construction funding at this time. Rather, the Trustees are selecting these projects for further development and evaluation under both OPA and NEPA in subsequent project specific Restoration Plans.

The PDARP/PEIS selected alternative identified a goal for the Wetlands, Coastal, and Nearshore Habitat restoration type as restoration in all five Gulf states that would provide benefits across the interconnected northern Gulf of Mexico ecosystem, placing particular emphasis on coastal and nearshore habitat restoration in the historic Mississippi River delta plain in Louisiana. The DWH Trustees recognized that Louisiana's diverse combination of habitats support a vast array of resources injured by the spill, and thus present an opportunity for restoration to benefit a large variety of injured species and ecological functions. As described in the PDARP/PEIS, the coastal wetlands within the Barataria Basin provide the foundational habitat for the Barataria Basin ecosystem, support resources within the Barataria Basin and throughout the Gulf of Mexico, and were among the most heavily oiled parts of the Gulf Coast shoreline. The extensive oiling of wetlands in the Barataria Basin not only directly impacted many of the species of flora and fauna that rely on those shorelines, but the oiling and associated response activities also significantly exacerbated the loss of these wetlands (e.g., Silliman et al., 2012; Zengel et al., 2015; Turner et al., 2016; Silliman et al., 2016; Rangoonwala et al., 2016; PDARP/PEIS, Ch. 4). These wetlands are also experiencing extremely high rates of land loss as a result of declines in sediment supply from the Mississippi River, combined with subsidence and eustatic sea level rise. The significant impact from the spill combined with the sustained loss of wetlands, makes the Barataria Basin an important region to focus restoration by the LA TIG. The Trustees believe restoration in the Barataria Basin has the potential to provide significant benefits to the Gulf of Mexico ecosystem.

Purpose of Strategic Restoration Planning

The PDARP/PEIS explains that the DWH Trustees may use strategic restoration plans "to focus and sequence priorities within a Restoration Area" and to "consider resources at the ecosystem level, while implementing restoration at the local level" (PDARP/PEIS, Section 7.3.1). This SRP/EA aids the Trustees' consideration of resources at the ecosystem level and provides context for prioritization, sequencing, evaluating, and selecting specific projects within subsequent project-specific restoration plans. The purpose of this SRP/EA is to help restore for ecosystem-level injuries in the Gulf of Mexico through restoration of critical wetlands, coastal, and nearshore habitat resources and services in the Barataria Basin. The LA TIG selected the Barataria Basin as the geographic scope for this SRP/EA because, in addition to the high rates of erosion in the Barataria Basin, wetlands in the Barataria Basin experienced some of the heaviest and most persistent oiling and associated response activities from the DWH oil spill (Michel et al., 2013; Zengel and Michel, 2011). Critically, the wetlands in this estuary support very high primary and secondary production that contribute to the overall function of the northern Gulf of Mexico ecosystem. Multiple projects in the Barataria Basin have been suggested by the public to the Trustees, including large-scale sediment diversions and large-scale marsh creation. The PDARP/PEIS identified both of these restoration techniques as key to restoring Wetlands, Coastal and Nearshore Habitat. Planning and evaluating substantial projects, such as sediment diversions

and large-scale marsh creation, can require significant investments of time and cost. The Trustees believe preparing this strategic restoration plan to prioritize approaches and techniques will allow for the most efficient use of restoration funds.

The process of identifying proposed alternatives considered in this SRP/EA included requests for public input and notification of TIG process in accordance with the Trustee Council Standard Operating Procedures (Trustee Council SOP). In March 2017, the LA TIG published a Notice of Solicitation (NOS) of Project Ideas requesting the public's input regarding natural resource restoration opportunities in Louisiana, focusing on projects that restore and conserve wetlands, coastal, and nearshore habitats in the Barataria Basin.[2] On April 28, 2017, a Notice of Intent (NOI) was published in the Federal Register (FR) by the LA TIG announcing its intention to prepare a Strategic Restoration Plan for the Barataria Basin, Louisiana, that would consider identifying habitat restoration components of the Louisiana Draft 2017 Coastal Master Plan (Draft 2017 CMP), among other feasible alternatives, to serve as an OPA Strategic Restoration Plan for restoring wetlands, coastal, and nearshore habitat in the Barataria Basin, Louisiana, consistent with OPA and the DWH Trustees' PDARP/PEIS.

Range of Alternatives

The LA TIG prepared this SRP/EA in accordance with the PDARP/PEIS, the March 2016 Record of Decision (ROD) selecting a Comprehensive Integrated Ecosystem Alternative, the OPA and NEPA statutes, and relevant Natural Resource Damage Assessment (NRDA) and National Environmental Policy Act (NEPA) regulations. To restore for the ecosystem injuries identified in the PDARP/PEIS, the LA TIG focused on two approaches: creating, restoring and enhancing coastal wetlands; and restoring and preserving Mississippi-Atchafalaya River processes. These approaches provide the most direct link to restoring, creating, and maintaining coastal wetland habitat in the Barataria Basin. To develop alternatives, the Trustees followed this approach:

- **Step one**: The LA TIG identified which restoration approaches and techniques are most compatible with restoring wetlands, coastal, and nearshore habitat in the Barataria Basin.
- **Step two**: The LA TIG compiled a list of potential projects submitted in response to the March 2017 NOS to the federal and state project portals. The LA TIG also did an initial pre-screening of projects from the Final 2017 Louisiana CMP (see http://coastal.la.gov/our-plan/2017-coastal-master-plan/planning-process/projects/) to identify CMP projects of potential geographic and ecological relevance to this SRP/EA (e.g., screening out non-structural risk reduction projects). The combined list of projects submitted in response to the NOS plus projects pre-screened from the CMP were then carried forward to step three.

[2] Specifically, restoration approaches identified in the PDARP/PEIS that can sustainably create, restore, and enhance coastal wetlands and restore and/or preserve Mississippi River processes). See: http://www.gulfspillrestoration.noaa.gov/2017/03/request-restoration-project-ideas-louisiana and http://la-dwh.com/2016_2017Restoration.aspx.

- **Step three**: The LA TIG screened the list of projects from step two using a set of screening criteria focused on applicability to this SRP/EA.
- **Step four**: The LA TIG developed appropriate strategic restoration alternatives that logically combine restoration approaches and techniques exemplified by the projects that passed through the screening of step three.

The goal was to identify a reasonable range of options for compensating the public for injuries to Louisiana's wetlands, coastal, and nearshore habitat in the Barataria Basin and to the injured resources that benefit from these habitats. Identification and evaluation of feasible alternatives meets the requirements of both OPA and NEPA and their implementing regulations.

The LA TIG identified four strategic alternatives that, with the exception of natural recovery, meet the SRP/EA's purpose and need "to restore ecosystem-level injuries in the Gulf of Mexico through restoration of critical wetlands, coastal, and nearshore habitat resources and services in the Barataria Basin." The four alternatives are as follows:

Alternative 1: Marsh creation and ridge restoration plus large-scale sediment diversion

Alternative 2: Marsh creation and ridge restoration plus shoreline protection

Alternative 3: Marsh creation and ridge restoration

Alternative 4: Natural recovery/No-action

For each alternative, the LA TIG evaluated each OPA criterion independently, and determined how well the alternative met each criterion. In addition to evaluating these approaches under OPA, additional considerations under NEPA were included in the analysis. This SRP/EA serves as a tiered EA from the PDARP/PEIS (40 C.F.R. 1502.20; 1502.21). In this SRP/EA, the Trustees evaluated whether the approaches and techniques included in this SRP/EA fall within the scope of the impacts analysis conducted in Chapter 6 of the PDARP/PEIS for those restoration approaches, and have not identified any new significant impacts.

The Preferred Alternative

The Trustees have selected Alternative 1 as the preferred alternative. Under this alternative, the Trustees would support a suite of restoration projects in the Barataria Basin, including projects that would create marsh and restore ridges together with the implementation of large-scale sediment diversions to restore deltaic processes. The analysis under both OPA and NEPA demonstrates that Alternative 1 would provide the greatest level of benefits to injured Wetlands, Coastal, and Nearshore habitats and to the large suite of injured resources that depend in their lifecycle on productive and sustainable wetland habitats. This alternative best meets the goals for this restoration type described in the PDARP/PEIS, has a high likelihood of success, and would reduce some sources of future injury (particularly erosion). The Trustees acknowledge that there may be collateral injury and impacts to public health and safety, physical, biological, and socioeconomic resources in the Barataria Basin. These impacts were evaluated as part of the PDARP/PEIS and will be further analyzed as part of any Phase II restoration plan. Despite the potential for a range of possible adverse impacts, the LA TIG has determined that the preferred alternative will provide long-term ecosystem-level benefits and restoration of injured resources

and have an overall positive impact on public health and safety and the environment affected by the spill.

Diversions of Mississippi River water, nutrients, and sediment into adjacent wetlands have a high probability of providing large-scale benefits for the long-term sustainability of deltaic wetlands and the Gulf of Mexico ecosystem. Large-scale sediment diversions are designed for significant wetland/marsh-building through the transportation of large quantities of mineral sediments via high discharge volumes from the Mississippi River. If correctly designed, sited, and operated, large-scale sediment diversions will help restore injured wetlands and resources by reducing widespread loss of existing sediment deposition to partially offset relative sea level rise and help build and maintain wetlands (Andrus, 2007; Day et al., 2012; DeLaune et al., 2003; DeLaune et al., 2013; Kemp et al., 2014). Further, large-scale sediment diversions will reestablish the full suite of deltaic processes including enhancement of trophic dynamics and nutrient cycling. Despite the high cost of construction, large-scale sediment diversions are anticipated to be more cost-effective long-term than other methods of marsh creation and are the only technique capable of producing the full suite of ecological benefits to the Gulf of Mexico ecosystem provided by the reestablishment of deltaic processes.

Marsh creation projects directly restore wetland habitat; these projects are typically located in areas that have historically supported marsh habitat, but the marsh has been lost to natural and human-induced processes. Marsh creation projects through the placement of dredged materials can be implemented quickly, targeted to specific locations with currently degraded habitat, and have a track record of success within Louisiana. Ridge restoration projects are designed to complement marsh creation projects by protecting the marshes from further losses due to storm surge and wave action. These projects re-establish historical ridge features within the marsh complex that are important to the complex habitats and hydrology of the Barataria Basin.

Modeling demonstrates that marsh creation projects, when built along with large-scale sediment diversion projects such as the Mid-Barataria Sediment Diversion, yield more net habitat gain than developing either alternative in isolation (CPRA, 2017; see pp. 133-134). Marsh creation projects can build habitat relatively quickly, and once built can help retain the sediment being introduced into the basin by the diversion. At the same time, the influx of sediment from the diversion will help make the marsh creation projects more sustainable over the long term, by providing a continuous source of sediment, freshwater, and nutrients to maintain marsh growth. Large-scale sediment diversions also have the potential to reduce impacts from relative sea level rise in the Barataria Basin, by providing a sustainable source of sediment to replenish land as it is inundated, thus contributing to long-term resiliency. Thus, the Trustees have concluded that other restoration techniques, such as large marsh creation projects or multiple small-scale sediment diversions, cannot by themselves deliver the same benefits or perform the same functions as an alternative that includes a large-scale sediment diversion.

Based on this analysis, the preferred alternative would restore a variety of interspersed and ecologically connected coastal habitats, because the combination of marsh creation, ridge restoration, and large-scale sediment diversion techniques would build/maintain marsh and ridge habitat across a large area of the Barataria Basin. This alternative would restore for injuries in the Barataria Basin, where the greatest oiling injuries in Louisiana occurred. By creating

sustainable wetland habitats in the Barataria Basin, this alternative would address injuries in the Gulf of Mexico ecosystem that depend on productive wetlands. This alternative also provides resiliency and sustainability for restoring wetlands, coastal and nearshore habitat because large-scale sediment diversions and marsh creation and ridge restoration together yield a greater net gain of wetlands than any of these techniques individually.

Projects Advanced for Further Evaluation

During the screening process, the Trustees identified the following projects that meet the criteria set out by the LA TIG:

- Two Large-Scale Diversions: Mid-Barataria Sediment Diversion, Ama Sediment Diversion
- Marsh Creation: Large-Scale Marsh Creation – Component E, Lower Barataria Marsh Creation – Component A
- Ridge Restoration: Grand Bayou Ridge Restoration, Bayou Eau Noire Ridge Restoration, Adams Bay Ridge Restoration, Red Pass Ridge Restoration
- Combined ridge restoration and marsh creation: Spanish Pass Increment of the Barataria Basin Ridge and Marsh Creation
- Shoreline Protection: Lake Hermitage Shoreline Protection, East Snail Bay Shoreline Protection, West Snail Bay Shoreline Protection, Bayou Perot Shoreline Protection

The LA TIG selected the Mid-Barataria Sediment Diversion and one marsh creation increment within Large Scale Marsh Creation - Component E in Barataria Basin for advancement and further evaluation under both OPA and NEPA in Phase II restoration plans and NEPA. The Trustees also confirm their 2017 decision to move the Spanish Pass Increment of the Barataria Basin Ridge and Marsh Creation project forward for further evaluation and planning.

The Large-Scale Barataria Marsh Creation – Component E project as a whole would create approximately 12,900 acres of marsh at the time of construction in Plaquemines and Jefferson parishes, Louisiana, in the Barataria Basin, south of The Pen to the Barataria Landbridge, to create new wetland habitat and restore degraded marsh. The 2017 CMP project cost estimate includes $48,700,000 for planning/engineering and design, $608,600,000 for Construction, and $17,200,000 for Operations and Maintenance (O+M) for a total cost of $674,500,000.

The Mid-Barataria Sediment Diversion (MBSD) is located near Ironton in Plaquemines Parish, Louisiana. Based on the model outputs, the MBSD is expected to build or maintain 8,041 acres of land in the near-term (Year 20) and 29,686 acres of land in the long-term (Year 50). The 2017 CMP project cost estimate includes $39,400,000 for planning/engineering and design (already funded through National Fish and Wildlife Foundation [NFWF]), $821,400,000 for construction, and $138,000,000 for O+M, for a total cost of $998,800,000, of which $959,400,000 is not yet funded.

The Spanish Pass Increment of the Barataria Basin Ridge and Marsh Creation was previously selected to move forward with Engineering and Design in Louisiana's First Restoration Plan (Louisiana Trustee Implementation Group, 2017). That selection is consistent with the preferred alternative identified in this SRP/EA and is therefore affirmed by, and incorporated into, this Plan.

The LA TIG is proposing to advance these specific projects for further analysis for several reasons. First, the location of these projects places them in close proximity to some of the most heavily oiled portions of the Louisiana coastline. Second, Large Scale Marsh Creation – Component E proposes to use a nearby Mississippi River borrow source. If the Mississippi River borrow source were dredged for marsh creation after the MBSD was in operation, there would be a decrease in the effectiveness of sediment capture by the MBSD, resulting in a lower cost-effectiveness for the MBSD project. Thus, the project needs to be evaluated in time to be sequenced prior to any potential diversion in that location. The proximity of the MBSD and the Large-Scale Marsh Creation- Component E to each other will maximize the synergistic benefits of the two projects. In contrast, the Ama Sediment Diversion is located in the upper portion of the Barataria Basin and is not shown to synergistically benefit the marsh creation projects considered in this Plan. As noted in the LA TIG's Restoration Plan #1, the design of the Spanish Pass Increment of the Barataria Basin Ridge and Marsh Creation project will not be affected by the MBSD project, and thus this project will not be delayed by the design, construction, or operation of the diversion. These projects have a high likelihood of success based on the information that already has been developed using modeling and related analysis. For example, the MBSD project has been studied in different iterations of the 2012 and 2017 CMP, and multiple other studies including in the Louisiana Coastal Area Hydrodynamic and Delta Management Study. It also has undergone initial project-specific engineering and design at CPRA. Lastly, while many of these projects may be considered in future plans, limited availability of funds limits how many can be prioritized at this time.

Relationship of SRP/EA to Mid-Barataria Sediment Diversion Permit Process

In light of the need to address the severe sustained land loss in the Barataria Basin as soon as possible, the CPRA has submitted a permit application to the U.S. Army Corps of Engineers (USACE) for the MBSD, anticipating that the permitting process could take time. The permit application was not a proposal by the LA TIG to pursue Mid-Barataria Sediment Diversion as a restoration project. However, after the permit process began, the LA TIG took steps to participate in that process. This was due in part to the DWH Trustees' prior recognition in the PDARP/PEIS that large-scale sediment diversions are an important restoration technique that would be considered as the DWH Trustees began to implement the restoration called for in the PDARP/PEIS. The particular large-scale sediment diversion applied for by the State – the Mid-Barataria Sediment Diversion – has been the subject of long discussion prior to the PDARP/PEIS among experts as one of the most promising potential diversions, in terms of its potential to create and help sustain marsh/wetlands complexes on an ecosystem scale. Given this background and the potential importance of a MBSD to any ultimate restoration strategy, the Federal Trustees stated their intention to participate as cooperating agencies under NEPA in the USACE's development of an Environmental Impacts Statement (EIS) for that project and have worked to do so by funding their participation with LA TIG monies and by developing a Memorandum of Understanding (MOU) with the USACE describing the Trustees' role in EIS development.

Before investing too much time and energy in the EIS development for the MBSD project in the context of the USACE's permitting process, the LA TIG believes it would be best to determine an overall wetland/marsh restoration strategy for the Barataria Basin. The LA TIG believes that doing so now is important, for at least two reasons. First, the LA TIG needs to decide whether

large-scale sediment diversions are part of its overall restoration strategy for the Barataria Basin before it can decide whether substantial TIG funding should be expended on any particular sediment diversion. Thus far, only modest amounts of funding have been expended on LA TIG participation in the USACE's permitting process. The potential "funding curve" for any large-scale river diversion makes it especially appropriate for the LA TIG to decide now on a wetlands/marsh restoration strategy for the Barataria Basin. For example, if the LA TIG were to decide that an overall restoration strategy should not include large-scale sediment diversions, making that decision now would allow the LA TIG to focus expenditures on restoration techniques other than diversions, and the LA TIG likely would minimize its involvement in the USACE's permitting process for the MBSD. Second, if the LA TIG decides to include one or more large-scale sediment diversions in its restoration strategy (as is proposed in this document), making that decision now will allow the LA TIG to better coordinate needed environmental analysis of a MBSD with the EIS being developed as part of the USACE's permitting process. In particular, this SRP/EA will focus the LA TIG's future restoration efforts as they relate to the MBSD, including using the EIS under development in the USACE's permitting process in a way that avoids duplication of effort in future restoration planning done by the LA TIG.

Following selection of a preferred strategic alternative that includes a large-scale sediment diversion, the Trustees propose that the MBSD project be advanced for further evaluation under both OPA and NEPA. Through this SRP/EA, the Trustees have solicited and considered public comment on that proposal before making any final determination. In addition, it is important to understand that, although the LA TIG is selecting the preferred alternative in this SRP/EA and selecting the MBSD for further review, the MBSD will not be selected for construction until subsequent OPA and NEPA evaluation have been completed, including a detailed analysis of impacts from different operational designs. Further OPA and NEPA evaluation would be part of a subsequent restoration decision by the Trustees. The Trustees will, as cooperating agencies with the USACE's MBSD EIS, work to ensure that any future Phase II restoration plan OPA/NEPA analysis takes advantage of the environmental analysis conducted in the USACE's EIS. As noted above, one of the reasons for proposing this SRP/EA now is to ensure that the Trustees can make cost-efficient decisions regarding restoration planning, and reducing duplicative efforts is precisely the kind of efficiency that can be gained by development of the SRP/EA.

Public Comment

On December 20, 2017, the LA TIG released the Draft SRP/EA. The Draft SRP/EA was made available for public review and comment for 45 days as specified in the public notice published in the Federal and Louisiana Registers. A public meeting was held January 24, 2018 in New Orleans to present the Draft SRP/EA and hear public comments on the plan.

This Final SRP/EA was completed only after review, consideration, and response to public comments and this Final SRP/EA has been modified in response to those comments. While many public comments supported the preferred alternative to support wetlands, coastal, and nearshore habitat restoration, others highlighted concerns for adverse effects to a variety of resources. The LA TIG has considered those issues and decided to proceed to Phase II planning regarding several specific restoration projects, bearing in mind that those issues require more detailed analysis and evaluation in Phase II planning and in associated NEPA analyses. The public will have additional opportunities to participate and provide public input as part of those OPA and NEPA processes.

Key Changes in the Final SRP/EA

The LA TIG revised the Draft SRP/EA after considering the public comments received. The LA TIG also made minor editorial and technical revisions to the document to address issues found through internal review of the Draft SRP/EA. None of these revisions affected the conclusions of the SRP/EA. An overview of the changes is included below. The LA TIG has added Section 7 to the Final SRP/EA, which includes statements of concern summarizing the comments received and the Trustees' response to those comments.

Overview of Revisions to Executive Summary:

- The LA TIG made minor editorial text changes to correct typographical errors and improve clarity.
- The LA TIG made minor revisions to reflect changes made in the main body of the document, described below.

Overview of Revisions to Section 1:

- The LA TIG made minor editorial text changes to correct typographical errors and improve clarity.
- The LA TIG made minor revisions reflecting that this document is now a final document (instead of a draft) and the public comment process has been completed.
- In response to public comment, the LA TIG added clarifying language about the approach being taken to NEPA in this document.

Overview of Revisions to Section 2:

- The LA TIG made minor editorial text changes to correct typographical errors, fix figure numbering that was out-of-sequence, and improve clarity.

Overview of Revisions to Section 3:

- The LA TIG made minor editorial text changes to correct typographical errors and improve clarity.
- The LA TIG corrected Table 6 to note that, based on the evaluation in the PDARP/PEIS, the range of impacts for Alternative 1 is "minor to major" instead of "minor to moderate".
- In response to public comment, the LA TIG added clarifying language about the approach being taken to NEPA in this document.

Overview of Revisions to Section 4:

- The LA TIG made minor editorial text changes to correct typographical errors and improve clarity.

- In response to public comment, the LA TIG clarified that restoration will address, but not arrest, coastal habitat loss.
- The LA TIG corrected Figure 22 to label only a single increment of the Large-Scale Marsh Creation – Component E project as a priority increment. This change was also reflected in the text.
- In response to public comment, the LA TIG added clarifying language about the approach being taken to NEPA in this document.

Overview of Revisions to Section 5:

- In response to public comment, the LA TIG clarified that project-specific monitoring may also include monitoring of potential collateral impacts.

Overview of Revisions to Section 6:

- The LA TIG added language to clarify their approach to compliance processes.

1.0 Introduction

This "Louisiana Trustee Implementation Group Strategic Restoration Plan and Environmental Assessment #3: Restoration of Wetlands, Coastal, and Nearshore Habitats in the Barataria Basin, Louisiana" (SRP/EA) was prepared by the Louisiana Trustee Implementation Group (LA TIG) to analyze strategic restoration alternatives associated with the restoration of wetlands, coastal, and nearshore habitat resources and services in the Barataria Basin, which was heavily impacted by the *Deepwater Horizon* oil spill and associated response efforts (DWH oil spill). This SRP/EA also selects particular projects for further restoration planning and detailed environmental review in Phase II restoration plans.

The Trustees of the LA TIG (also referred to here interchangeably as "the LA TIG" or "the Trustees") are responsible for restoring the natural resources and services within the Louisiana Restoration Area that were injured by the DWH oil spill, which began on April 20, 2010. The purpose of restoration, as discussed in this document and detailed more fully in the Programmatic Damage Assessment and Restoration Plan/Programmatic Environmental Impact Statement (PDARP/PEIS), is to make the environment and the public whole for injuries resulting from the DWH oil spill by implementing restoration actions intended to return injured natural resources and services to baseline conditions and compensate for interim losses, in accordance with the Oil Pollution Act of 1990 (OPA) and associated Natural Resource Damage Assessment (NRDA) regulations. The Final PDARP/PEIS and Record of Decision (ROD) can be found at http://www.gulfspillrestoration.noaa.gov/restoration-planning/gulfplan/.

This document is also serving as an Environmental Assessment (EA) pursuant to the National Environmental Policy Act (NEPA) of the action being taken by the LA TIG under OPA. As the regulations published by the Council on Environmental Quality explain, an EA is a flexible environmental review document and "[a]gencies may prepare an [EA] on any action at any time in order to assist agency planning and decisionmaking" (40 CFR 1501.3(b)). The LA TIG prepared this EA to evaluate a reasonable range of alternatives comprised of a sub-set of restoration techniques initially considered in the PDARP/PEIS. The EA summarizes and discloses the environmental impacts specific to the strategic restoration alternatives selected for consideration in this SRP. The EA was also intended to support an open and transparent environmental decision-making process that fostered informed public involvement and informed agency decision-making. The LA TIG reviewed the PDARP/PEIS and found that it substantially addressed the environmental impacts likely to be caused by the Proposed Action and alternatives considered in the SRP/EA (see Section 1.10 for the definition of the Proposed Action). It therefore relied on and incorporated by reference relevant portions of the PDARP/PEIS to evaluate and disclose direct, indirect and cumulative impacts of the Proposed Action and alternatives.

This SRP/EA considered whether: (1) the PDARP/PEIS included a thorough evaluation of the potential range of environmental effects that could result from the various restoration approaches and techniques analyzed in the PDARP/PEIS; (2) the analysis of the environmental consequences of those approaches and techniques in the PDARP/PEIS remains valid; (3) the effects of the restoration approaches and techniques, including the projects selected for further planning and environmental review, evaluated in this SRP/EA are within the range of impacts

evaluated in the PDARP/PEIS; and (4) any new information regarding the environmental consequences of the restoration approaches and techniques, including the projects selected for further planning and environmental review, evaluated within this SRP/EA are within the range of and consistent with the environmental impacts identified and analyzed within the PDARP/PEIS. The EA tiers from and incorporates by reference relevant portions of the PDARP/PEIS.

After receiving public review and comment, the LA TIG has concluded that the PDARP/PEIS provides an adequate, informative discussion of the environmental effects, beneficial and adverse, likely to result from implementation of the Proposed Action and alternatives. Those effects are disclosed and evaluated below. No new or significant information related to the environmental effects of the Proposed Action and alternatives were identified. Additional restoration planning and environmental review will be conducted as part of a Phase II Restoration Plan and EA or EIS for any projects selected herein for additional restoration planning prior to any decision to fund construction for such project or projects.

The LA TIG includes five Louisiana state trustee agencies and four federal trustee agencies: the Louisiana Coastal Protection and Restoration Authority (CPRA); the Louisiana Department of Natural Resources (LDNR); the Louisiana Department of Environmental Quality (LDEQ); the Louisiana Oil Spill Coordinator's Office (LOSCO); the Louisiana Department of Wildlife and Fisheries (LDWF); the United States Department of Commerce (DOC), represented by the National Oceanic and Atmospheric Administration (NOAA); the United States Department of the Interior (DOI), represented by the United States Fish and Wildlife Service (USFWS) and National Park Service (NPS); the United States Department of Agriculture (USDA); and the Environmental Protection Agency (EPA). The full set of state and federal trustees is collectively referred to herein as the LA TIG. NOAA is the lead federal Trustee for preparing this SRP/EA, pursuant to NEPA. The federal and state agencies of the LA TIG are acting as cooperating agencies pursuant to NEPA in the development of this SRP/EA. Each federal cooperating agency on the LA TIG intends to adopt, if appropriate, the NEPA analysis in this SRP/EA. In accordance with 40 Code of Federal Regulations (CFR) §1506.3(a), each of the three federal cooperating agencies (DOI, EPA, and USDA) participating on the LA TIG will review the SRP/EA for adequacy in meeting the standards set forth in its own NEPA implementing procedures. Adoption of the EA would be completed via signature on the relevant NEPA decision document. There are no other cooperating federal, state, or local entities, or tribes.

The PDARP/PEIS provides TIGs the option to prepare strategic restoration plans "to focus and sequence priorities within a Restoration Area" and to "consider resources at the ecosystem level, while implementing restoration at the local level" (PDARP/PEIS Section 7.3.1). The LA TIG selected the Barataria Basin as the geographic scope for this SRP/EA because, in addition to the high rates of erosion in the Basin, wetlands in the Barataria Basin experienced some of the most heavy and persistent oiling from the DWH oil spill (Michel et al., 2013; Zengel and Michel, 2011). Critically, the wetlands in this estuary support very high primary and secondary production that contribute to the overall health of the northern Gulf of Mexico ecosystem.

In late March 2017, the LA TIG published a Notice of Solicitation (NOS) of Project Ideas, which requested the public's input regarding natural resource restoration opportunities in Louisiana, focused on the restoration type that restores and conserves wetlands, coastal, and nearshore

habitats in the Barataria Basin (specifically restoration approaches identified in the PDARP/PEIS that can sustainably create, restore, and enhance coastal wetlands and restore and/or preserve Mississippi River processes). See: http://www.gulfspillrestoration.noaa.gov/2017/03/request-restoration-project-ideas-louisiana and http://la-dwh.com/2016_2017Restoration.aspx.

On April 28, 2017, a Notice of Intent (NOI) was published in the Federal Register (FR) by the LA TIG announcing its intention to prepare a Strategic Restoration Plan for the Barataria Basin, Louisiana, pursuant to the PDARP/PEIS, that would consider identifying habitat restoration components in Louisiana's Comprehensive Master Plan for a Sustainable Coast (Coastal Master Plan [CMP]), among other feasible alternatives, to serve as an OPA Strategic Restoration Plan for restoring wetlands, coastal, and nearshore habitats for the Barataria Basin. Specifically, this SRP analyzes strategic restoration alternatives, (made up of combinations of example projects), that could restore, rehabilitate, replace, or acquire the equivalent of the injured wetlands, coastal, and nearshore habitat resources and services, and compensate for the interim losses of those resources from the DWH oil spill. The projects included within the preferred strategic restoration alternative (i.e., Alternative 1: Marsh creation and ridge restoration plus large-scale sediment diversions) will be further analyzed in subsequent phased restoration plans and accompanying environmental impact analyses as required by OPA, NEPA, and the PDARP/PEIS.

1.1 Background and Summary of the Settlement

On April 20, 2010, the DWH mobile drilling unit exploded, caught fire, and eventually sank in the Gulf of Mexico, resulting in a massive release of oil from the Macondo well, causing loss of life and extensive natural resource injuries. Initial efforts to cap the well following the explosion were unsuccessful, and for 87 days after the explosion, the well continuously and uncontrollably discharged oil and natural gas into the northern Gulf of Mexico. By the time the well was capped, the resulting ecological impact was unprecedented in scale: the spill released an estimated 139 million gallons of oil into the Gulf of Mexico ecosystem and created a surface oil slick as large as the state of Virginia (PDARP/PEIS, Ch. 4).

The DWH oil spill occurred within a northern Gulf of Mexico ecosystem where ecological resources and habitats are closely linked: energy, nutrients, and organisms move between habitats in this region, such that injuries to one habitat or species can have cascading impacts across the entire ecosystem (PDARP/PEIS, Ch. 3). As part of the injury assessment for the DWH oil spill, the DWH Trustees documented injuries to species including shrimp, fish, shellfish, birds, and marine mammals. These injuries ranged from decreased growth rates to reproductive effects and mortality. Many of these injured species depend on the nearshore marsh and estuarine habitats exemplified by those in the Barataria Basin for one or more of their life stages.

On February 19, 2016, the DWH Trustees issued a Final PDARP/PEIS detailing a specific proposed plan to fund and implement restoration projects across the Gulf of Mexico region into the future as restoration funds become available. That document describes Restoration Types, Approaches, and Techniques that meet the Trustee programmatic restoration goals as described in the Final PDARP/PEIS. On March 29, 2016, in accordance with OPA and NEPA, the DWH Trustees published a Notice of Availability (NOA) of a ROD for the Final PDARP/PEIS in 81 FR 17438. Based on the DWH Trustees' injury determination established in the Final PDARP/PEIS, the ROD set forth the basis for the DWH Trustees' decision to select Alternative A: Comprehensive

Integrated Ecosystem Alternative. As described in the PDARP/PEIS, "Alternative A is an integrated restoration portfolio that emphasizes the broad ecosystem benefits that can be realized through coastal habitat restoration in combination with resource-specific restoration in the ecologically interconnected northern Gulf of Mexico ecosystem." The DWH Trustees' selection of Alternative A includes the funding allocations established in the Final PDARP/PEIS.

On April 4, 2016, the United States District Court for the Eastern District of Louisiana entered a Consent Decree resolving civil claims by the DWH oil spill Trustees against BP Exploration and Production Inc. (BP) arising from the DWH oil spill. *United States v. BPXP et al.*, Civ. No. 10-4536, *centralized in* MDL 2179, *In re: Oil Spill by the Oil Rig "Deepwater Horizon" in the Gulf of Mexico, on April 20, 2010* (E.D. La.). This historic settlement resolved the Trustees' claims against BP for natural resource damages under OPA.

Under the Consent Decree, BP agreed to pay (over a 15-year period) a total of $8.1 billion in natural resource damages (which includes $1 billion that BP previously committed to pay for early restoration projects), and up to an additional $700 million (some of which is in the form of accrued interest) for adaptive management or to address injuries to natural resources that are presently unknown but may come to light in the future. Each Restoration Area has a specific monetary allocation to each of the 13 Restoration Types specified in the Consent Decree. The DWH settlement allocation for the LA TIG by Restoration Type is described in Section 5.10.2 of the PDARP/PEIS and presented below in Table 1.

Table 1
Restoration Funding in Dollars for the Louisiana Restoration Type
[This table excludes allocations for the Early Restoration work]

Major Restoration Categories and Restoration Types	Louisiana Restoration Area Funding Allocation ($)
1. Restore and Conserve Habitat	
Wetlands, Coastal, and Nearshore Habitats	4,009,062,700
Habitat Projects on Federally Managed Lands	50,000,000
2. Restore Water Quality	
Nutrient Reduction (Nonpoint Source)	20,000,000
3. Replenish and Protect Living Coastal and Marine Resources	
Sea Turtles	10,000,000
Submerged Aquatic Vegetation	22,000,000
Marine Mammals	50,000,000
Birds	148,500,000
Oysters	26,000,000
4. Provide and Enhance Recreational Opportunities	
Provide and Enhance Recreational Opportunities	38,000,000
5. Monitoring, Adaptive Management, and Administrative Oversight	
Monitoring and Adaptive Management	225,000,000
Administrative Oversight and Comprehensive Planning	33,000,000

More details on the background of the DWH oil spill, the impact of the spill on the Gulf of Mexico ecosystem, and additional context for the settlement and allocation of funds can be found in Chapter 2 of the PDARP/PEIS.

1.2 DWH Trustees, Trustee Council, and TIGs

The DWH Trustees are the government entities authorized under OPA to act on behalf of the public to: 1) assess the natural resource injuries resulting from the DWH oil spill, and then 2) plan and implement restoration to compensate the public for those injuries. The DWH Trustees fulfill these responsibilities by developing restoration plans, providing the public with a meaningful opportunity to suggest restoration projects and to review and comment on proposed plans, implementing and monitoring restoration projects, managing natural resource damage funds, and documenting trustee decisions through a public administrative record. The DWH Trustees are responsible for governance of restoration planning throughout the entire Gulf Coast. To work collaboratively on the NRDA, the DWH Trustees organized a Trustee Council composed of designated Natural Resource Trustee Officials, or their alternates, for each of the DWH Trustee agencies.

The following federal and state agencies are designated DWH Trustees:

- DOI as represented by NPS, USFWS, and Bureau of Land Management (BLM)
- NOAA, on behalf of DOC
- USDA
- EPA
- CPRA, LDNR, LDEQ, LOSCO, and LDWF
- Mississippi Department of Environmental Quality
- Alabama Department of Conservation and Natural Resources and Geological Survey of Alabama
- Florida Department of Environmental Protection and Florida Fish and Wildlife Conservation Commission
- Texas Parks and Wildlife Department, Texas General Land Office, Texas Commission on Environmental Quality

As specified in the Consent Decree and PDARP/PEIS, the DWH NRDA funds were distributed geographically to address the diverse suite of injuries that occurred at both regional and local scales. Specific amounts of money were allocated to seven geographically-defined restoration areas: each of the five Gulf States (Louisiana, Mississippi, Alabama, Florida, and Texas), Regionwide, and the Open Ocean. The Louisiana Restoration Area includes coastal and nearshore areas aligned with the geography of the State of Louisiana. The funding distribution was based on the DWH Trustees' understanding and evaluation of exposure and injury to natural resources and services, as well as their evaluation of where restoration spending for the various Restoration Types will be most beneficial within the ecosystem-level restoration portfolio.

The DWH Consent Decree established TIGs as the governing bodies for each Restoration Area defined in the Consent Decree. As specified in the Trustee Council standard operating procedures (Trustee Council SOP), TIGs are composed of individual DWH Trustee agency representatives; TIG members work together to accomplish TIG activities, including interacting with the public and stakeholders and planning for, selecting, and implementing specific restoration actions under the PDARP/PEIS. TIG activities are guided by the Trustee Council SOP and TIG decisions are made by consensus. Each TIG makes all restoration decisions for the funding allocated to its Restoration Area, and ensures its actions are fully consistent with OPA requirements, PDARP/PEIS, Consent Decree, and Trustee Council SOP.

1.3 Authorities and Regulations

1.3.1 OPA and NEPA Compliance

As an oil pollution incident, the DWH oil spill is subject to the provisions of OPA, 33 U.S.C. § 2701 *et seq.* A primary goal of OPA is to make the environment and public whole for injuries to natural resources and services resulting from incidents involving an oil discharge or substantial threat of an oil discharge. Under OPA, each party responsible for a vessel or facility from which oil is discharged, or which poses the substantial threat of a discharge, is liable for, among other things, removal costs and damages for injury to, destruction of, loss, or loss of use of natural resources, including the reasonable costs of assessing the damage. Under the authority of OPA, a council of federal and state trustees was established to assess natural resource injuries resulting from the incident and to work to make the environment and public whole for those injuries.

The process of injury assessment and restoration planning is referred to as NRDA. NRDA is described under Section 1006 of OPA (33 U.S.C. § 2706) and the Louisiana Oil Spill Prevention and Response Act (LOSPRA) (La. R.S. 30:2451 *et seq.*). Under the OPA and LOSPRA NRDA regulations (15 C.F.R. Part 990 and La. Admin. Code 43:XXIX.101 *et seq.*), the NRDA process consists of three phases: 1) Pre-assessment; 2) Assessment and Restoration Planning; and 3) Restoration Implementation. The DWH Trustees are currently in the Restoration Implementation phase of the NRDA. As part of the initiation of restoration implementation, this SRP/EA identifies a reasonable range of restoration alternatives for the Barataria Basin, evaluates these alternatives under various criteria, and selects a preferred alternative.

Restoration activities under OPA are intended to return injured natural resources and services to their baseline condition (primary restoration) and to compensate the public for interim losses from the time of the incident until the time resources and services recover to baseline conditions (compensatory restoration). To meet these goals, the restoration activities need to produce benefits that are related to or have a nexus (connection) to natural resource injuries and service losses resulting from the spill.

Under the OPA regulations, federal trustees must comply with NEPA, 42 U.S.C. § 4321 et seq., and its implementing regulations (40 CFR Parts 1500-1508) when planning restoration projects. NEPA provides a framework for federal agencies to determine if their proposed actions have significant environmental effects and related social and economic effects, consider these effects when choosing between alternative approaches, and inform and involve the public in the environmental analysis and decision-making process.

Given the massive scale of the DWH oil spill and needed restoration, the DWH Trustees established a tiered restoration planning and NEPA compliance process. The PDARP/PEIS considered on a broad programmatic level alternative means of restoring injured natural resources and selected an ecosystem based approach to be implemented through a suite of restoration types and techniques. The PDARP/PEIS allows for strategic restoration planning. In this document, the LA TIG has incorporated selected restoration approaches and techniques described and evaluated in the PDARP/PEIS, and selected particular projects for further restoration planning and environmental review. All of the approaches and techniques included in this SRP/EA, including the projects selected for further review, fall within the scope of the environmental consequences analyses conducted in Chapter 6 of the PDARP/PEIS for those restoration approaches and techniques. For these reasons, this SRP/EA tiers from, relies on and incorporates by reference much of the analysis in the PDARP/PEIS.

The LA TIG is exercising its discretion pursuant to NEPA (40 C.F.R. §§ 1501.3(b) to integrate an EA with this SRP in order to assist with restoration planning efforts and to further the purposes of NEPA. This SRP/EA tiers from the PDARP/PEIS and incorporates by reference the NEPA environmental consequences analysis found in Chapter 6 of the PDARP/PEIS (40 C.F.R. 1502.20; 1502.21). The LA TIG has found, based on its evaluation in the EA portion of this SRP/EA that: (1) the PDARP/PEIS included a thorough evaluation of the potential range of environmental effects that could result from the various restoration approaches and techniques analyzed in the PDARP/PEIS; (2) the analysis of the environmental consequences of those approaches and techniques in the PDARP/PEIS remains valid; (3) the effects of the restoration approaches and techniques, including the project selected for further planning and environmental review, evaluated in this SRP/EA are within the range of impacts evaluated in the PDARP/PEIS; and (4) any new information regarding the environmental consequences of the restoration approaches and techniques, including the projects selected for further planning and environmental review, evaluated within this SRP/EA are within the range of and consistent with the environmental impacts identified and analyzed within the PDARP/PEIS. The LA TIG's independent review of the environmental effects of the restoration techniques considered in this SRP/EA, as well as comments submitted by the public, did not reveal any substantial change in the action evaluated in the PDARP/PEIS; or any new information indicating significant environmental issues or circumstances presented by application of the restoration techniques and approaches specifically in the Barataria Basin.

More information about OPA and NEPA, as well as their application to the DWH oil spill restoration planning, can be found in Chapters 5 and 6 of the PDARP/PEIS.

1.3.2 Louisiana's Comprehensive Master Plan for a Sustainable Coast

Following Hurricanes Katrina and Rita in 2005, the Louisiana Legislature created CPRA and tasked it with coordinating the local, state, and federal efforts to achieve comprehensive coastal protection and restoration and combat Louisiana's coastal land loss crisis. To accomplish these goals, CPRA was charged with developing a coastal master plan (CMP) to guide the State of Louisiana's work toward these efforts. The restoration strategies and specific projects identified in the CMP are the result of extensive technical evaluation, public input, review, and vetting.

CPRA completed its first iteration of the CMP in 2007. After 2007, state and federal investments in the protection and restoration of Louisiana's coast increased dramatically. These investments allowed for the implementation of improvements to Louisiana coastal communities' hurricane protection systems, as well as shoreline protection, marsh creation, barrier island repairs, and other projects. These projects taught the engineers and planners involved in this effort many lessons and allowed them to begin to plan for and evaluate landscape-scale efforts.

The CMP was updated in 2012. The 2012 CMP looked 50 years into Louisiana's future and presented large-scale actions that best matched available resources with the needs of the coast. The Louisiana Legislature unanimously approved the 2012 CMP.

The 2017 CMP carries previous planning efforts forward by improving the tools used for scientific analysis and predictions, incorporating new ideas and information, expanding stakeholder engagement, and focusing more on communities and comprehensive flood risk resilience. The 2017 CMP was passed through the Louisiana State House and Senate with bipartisan support and approved on June 2, 2017. More information about these updates and the 2017 CMP development process can be found at http://coastal.la.gov/a-common-vision/2017-master-plan-update/.

In furtherance of Louisiana's strategy for coastal restoration, Louisiana Governor John Bel Edwards issued Executive Order JBE 2016-09. Executive Order JBE 2016-09 requires all State of Louisiana departments and agencies to "administer their regulatory practices, programs, projects, contracts, grants, and all other functions vested in them in a manner consistent with the CMP and public interest to the maximum extent possible."[3] The departments of the State of Louisiana are required to act consistently with this directive when acting in their capacity as DWH Natural Resource Trustees and as members of the LA TIG, including decisions by the LA TIG to expend funding on a particular project.

1.4 Trustee Council Standard Operating Procedures

Another document which guides restoration planning is the 2016 Trustee Council Standard Operating Procedures for Implementation of the Natural Resource Restoration for the DWH Oil Spill (Trustee Council SOP). The Trustee Council developed the standard operating procedures (SOPs) for administration, implementation, and long-term management of restoration under the Final PDARP/PEIS. The Trustee Council SOP articulates the overall structure, roles, and decision-making responsibilities of the Trustee Council and provides the common procedures to be used by all TIGs. The Trustee Council SOP addresses, among other issues, the following topics: decision-making and delegation of authority, funding, administrative procedures, project reporting, monitoring and adaptive management (MAM), consultation opportunities among the DWH Trustees, public participation, and the Administrative Record. The Trustee Council SOP is available through the NOAA Restoration Portal, here:

[3] Available at http://gov.louisiana.gov/assets/ExecutiveOrders/JBE16-09.pdf.

http://www.gulfspillrestoration.noaa.gov/sites/default/files/wp-content/uploads/DWH-SOPs.pdf.

The Trustee Council SOP was developed and approved by consensus of the Trustee Council and may be amended as needed. The division of responsibilities among the Trustee Council, TIGs, and Individual Trustee Agencies is summarized in Table 7.2-1 of the Final PDARP/PEIS.

1.5 Relationship of the Barataria Basin SRP/EA to the PDARP/PEIS

As the programmatic restoration plan for restoring injuries from the DWH oil spill, the PDARP/PEIS provides direction and guidance for identifying, evaluating, and selecting future restoration projects to be carried out by the TIGs (PDARP/PEIS, Section 5.10.4 and Chapter 7). The DWH Trustees elected to prepare a PEIS to support analysis of the environmental consequences of the DWH Trustees' selected restoration types, to consider the multiple related actions that may occur as a result of restoration planning efforts, and to allow for a better analysis of cumulative impacts of potential actions. The PEIS was also developed to support "tiered" analysis and decision-making with the anticipation that certain future restoration actions could be undertaken without additional NEPA review, while others might proceed based on more focused "tiered" EAs or EISs. The programmatic approach was taken to assist the DWH Trustees in their development and evaluation and to assist the public in its review of future restoration projects.

For the PDARP/PEIS, the DWH Trustees developed a set of restoration types for inclusion in programmatic alternatives, consistent with the desire to seek a diverse set of projects providing benefits to a broad array of potentially injured resources and services they provide. Ultimately, this process resulted in the inclusion of 13 restoration types in the programmatic alternatives evaluated for restoration, including:

1. Wetlands, Coastal, and Nearshore Habitats
2. Habitat Projects on Federally Managed Lands
3. Nutrient Reduction (Nonpoint Source)
4. Water Quality (e.g., Stormwater Treatments, Hydrologic Restoration, Reduction of Sedimentation, etc.)
5. Fish and Water Column Invertebrates
6. Sturgeon
7. Submerged Aquatic Vegetation
8. Oysters
9. Sea Turtles
10. Marine Mammals

11. Birds
12. Mesophotic and Deep Benthic Communities
13. Provide and Enhance Recreational Opportunities

As described in the NOI, "the LA TIG is proposing that this SRP will focus on wetlands, coastal, and nearshore habitat restoration type projects in the Barataria Basin restoration area, because the PDARP/PEIS found that the Barataria Basin experienced some of the heaviest and most persistent oiling and associated response activities from the DWH oil spill and because the Barataria Basin supports very high primary and secondary production that contributes to the overall health of the northern Gulf of Mexico ecosystem."

The Barataria Basin is located immediately south and west of New Orleans, Louisiana. The Barataria Basin is bounded on the north and east by the Mississippi River from Donaldsonville to Venice, on the south by the Gulf of Mexico, and on the west by Bayou Lafourche. The Barataria Basin is an irregularly-shaped area bounded on each side by a distributary ridge formed by the present and former channels of the Mississippi River (Figure 1). A chain of barrier islands separates the basin from the Gulf of Mexico. In the northern half of the basin, which is bisected by the Gulf Intracoastal Waterway, several large lakes occupy the area between the ridges. The southern half of the basin consists of tidally influenced marshes connected to a large bay system behind the barrier islands (Coastal Wetlands Planning, Protection and Restoration Act [CWPPRA], 2017).

Historically, Mississippi River channel migration, crevasses, and overbank flooding deposited sediment, freshwater, and nutrients in the Barataria Basin, building land and sustaining wetland habitats. However, levees and Mississippi River channelization have altered natural fluvial interaction and sediment transport from the river into the basin, removing the source of sediment and freshwater that built and maintained the wetlands relative to subsidence and sea level rise. Other activities have exacerbated wetland loss including the excavation of canals for transportation and oil exploration, the introduction of invasive species, and sea level rise. Recent hurricane events and the DWH oil spill also have exacerbated habitat loss in the basin.

Barataria Basin suffered the brunt of the DWH oil spill wetland injuries. By state, the majority of oiled shoreline (approximately 65%) was in Louisiana, including the vast majority of oiled wetland shorelines (95%; Nixon et al., 2015). The extensive oiling of wetlands in the Barataria Basin not only directly impacted many of the species of flora and fauna that rely on those shorelines, but the oiling and associated response activities also significantly exacerbated the loss of these wetlands (e.g., Silliman et al., 2012; Zengel et al., 2015; Turner et al., 2016; Silliman et al., 2016; Rangoonwala et al., 2016; PDARP/PEIS, Ch. 4).

Figure 1. The Barataria Hydrologic Basin, Louisiana.
Basin outline as described in CWPPRA (2017).

This SRP/EA evaluates several strategic restoration alternatives, including a number of example projects, which fall under the "Wetlands, Coastal, and Nearshore Habitats" restoration type, described in the PDARP/PEIS to meet restoration needs in the Barataria Basin (i.e. a reasonable range of alternatives responsive to the purpose and need stated in Section 1.6). The LA TIG prepared this SRP/EA consistent with the PDARP/PEIS, the March 2016 ROD selecting a Comprehensive Integrated Ecosystem Alternative, the OPA and NEPA statutes, and relevant NRDA regulations. As noted in Chapter 7 of the PDARP/PEIS, TIGs may prepare strategic frameworks to focus and sequence priorities within a restoration area or to provide additional vision of how to meet restoration type goals set forth in the PDARP/PEIS. Strategic frameworks assist the restoration planning process by providing context for prioritization, sequencing, evaluating, and selecting specific projects within subsequent project-specific restoration plans. Strategic frameworks help the Trustees consider resources at the ecosystem level, while implementing restoration at the local level. These frameworks can also support monitoring and adaptive management strategies. Strategic planning can also create streamlining efficiencies for regulatory compliance, such as Endangered Species Act (ESA) consultation.

This SRP/EA tiers from the Final PDARP/PEIS and relies on the environmental information in the PDARP/PEIS to inform the LA TIG's consideration and selection of restoration types for the Barataria Basin. It does not select specific projects for construction. Those decisions are made through Phase II restoration planning. Additional environmental review pursuant to NEPA will be conducted as part of a Phase II restoration plan for any projects selected for further planning prior to a construction funding decision. The process outlined in this Plan is fully consistent with

the goals set out in the Final PDARP/PEIS for restoring wetlands, coastal, and nearshore habitats, which include the following:

- Restore a variety of interspersed and ecologically connected coastal habitats in each of the five Gulf states to maintain ecosystem diversity, with particular focus on maximizing ecological functions for the range of resources injured by the spill, such as oysters, estuarine-dependent fish species, birds, marine mammals, and nearshore benthic communities.
- Restore for injuries to habitats in the geographic areas where the injuries occurred, while considering approaches that provide resiliency and sustainability.
- While acknowledging the existing distribution of habitats throughout the Gulf of Mexico, restore habitats in appropriate combinations for any given geographic area. Consider design factors, such as connectivity, size, and distance between projects, to address injuries to the associated living coastal and marine resources and restore the ecological functions provided by those habitats.

1.6 Purpose and Need

The purpose of this SRP/EA is to restore ecosystem-level injuries in the Gulf of Mexico through restoration of critical wetlands, coastal, and nearshore habitat resources and services in the Barataria Basin. It is intended to identify a restoration strategy that prioritizes restoration approaches and techniques for further restoration planning in the Barataria Basin. The SRP is intended to ensure that the Trustees carry out their statutory and regulatory duties on behalf of the public to restore injured natural resources in the Barataria Basin in a manner consistent with the OPA and its implementing regulations as well as the goals and objectives of the PDARP/PEIS. The Trustees are not selecting any specific project for construction in this SRP/EA; however, the LA TIG is selecting several projects for further development and evaluation under OPA and NEPA in subsequent Phase II restoration plans. Other projects in addition to those identified in this SRP may also be carried forward by the Trustees at a later date. This SRP/EA is consistent with and tiers from the Final PDARP/PEIS, which identifies extensive and complex injuries to natural resources and services across the Gulf of Mexico, including in Louisiana, as well as a need to plan for comprehensive restoration consistent with OPA. This SRP/EA identifies a range of strategic restoration alternatives to guide further restoration planning in the Barataria Basin. The SRP/EA also identifies a variety of example projects that pertain to each of the alternatives. Additional information about the overall Purpose and Need for DWH NRDA restoration can be found in Section 5.3.2 of the PDARP/PEIS, pages 5-11.

1.7 Alternatives Evaluated in This Plan

In developing restoration alternatives to address the ecosystem-level injury and the current state of ecosystem decline in the Barataria Basin, the LA TIG considered the restoration approaches identified in the PDARP/PEIS within the restoration type Wetlands, Coastal, and Nearshore Habitats. The LA TIG identified four strategic alternatives that combine PDARP/PEIS approaches and techniques in a logical manner. With the exception of the natural recovery alternative, each of these alternatives meets the SRP/EA's purpose and need "to restore ecosystem-level injuries in the Gulf of Mexico through restoration of critical wetlands, coastal, and nearshore habitat

resources and services in the Barataria Basin." The four alternatives which are evaluated under OPA and under NEPA are as follows:

Alternative 1: Marsh creation and ridge restoration plus large-scale sediment diversion

Alternative 2: Marsh creation and ridge restoration plus shoreline protection

Alternative 3: Marsh creation and ridge restoration

Alternative 4: Natural recovery

These strategic restoration alternatives are described and evaluated in Section 3.0.

1.7.1 Understanding the Natural Recovery/No-Action Alternative

According to the OPA regulations, "Trustees must consider a natural recovery alternative in which no human intervention would be taken to directly restore injured natural resources and services to baseline" (40 CFR § 990.53[b][2])." For purposes of this plan, this natural recovery alternative also serves as the "no-action" alternative required under NEPA. The DWH Trustees considered a natural recovery/No-Action Alternative in the PDARP/PEIS (Section 5.8). At the programmatic level of the PDARP/PEIS, the natural recovery/No-Action Alternative would have involved no additional restoration done by the DWH Trustees after construction of the Early Restoration projects funded through the Early Restoration Framework Agreement. In the PDARP/PEIS, the DWH Trustees noted that a natural recovery alternative "could result in one of four outcomes for injured resources: 1) gradual recovery, 2) partial recovery, 3) no recovery, or 4) further deterioration." Even for those resources that could make a gradual recovery without additional restoration, the DWH Trustees noted that a natural recovery/No-Action Alternative would not compensate the public for the interim losses of natural resources during the recovery period. Thus, in the PDARP/PEIS, the DWH Trustees rejected the natural recovery/no-action alternative and did not present a comparative evaluation of this alternative under OPA.

Loss of natural deltaic processes in this river-dependent ecosystem has resulted in a steady decline in the health of natural resources in the Barataria Basin, which is indicated by metrics such as decreased plant health, high rates of erosion, and increases in salinity (Alber et al., 2008; Beland et al., 2017; Couvillion et al., 2011; Khanna et al., 2013; McClenachan et al., 2013; Mckee et al., 2004; Rangoonwala et al., 2016; Silliman et al., 2012, 2016; Turner et al., 2016; Wilson and Allison, 2008; Zengel et al., 2014, 2015). Further, the coastal habitats of the northern Gulf of Mexico support resources throughout the Gulf (Baltz et al., 1993; Boesch and Turner, 1984; Deegan et al., 2002; Gunter, 1967; Houde and Rutherford, 1993; Nixon, 1980; Roger et al., 1993). Thus, for the wetlands, coastal, and nearshore habitats in the Barataria Basin that are the focus of this SRP/EA, a natural recovery/No-Action Alternative would result in further deterioration of injured resources within and beyond the Barataria Basin.

Given that the DWH Trustees rejected a natural recovery alternative in the PDARP/PEIS, the LA TIG is not required to carry forward a natural recovery alternative for analysis under OPA in this SRP/EA, which is a tiered plan from the PDARP/PEIS. A no-action alternative is included in this SRP/EA because comparison of the environmental consequences of proposed alternatives with a

no-action alternative is still a requirement under NEPA and the no action alternative will establish a critical baseline condition of resources against which the impacts of the action alternatives can be compared and contrasted. It also is important to understand the implications of a natural recovery scenario in Barataria Basin, because the natural recovery scenario is the scenario against which the potential benefits of restoration projects need to be evaluated. Thus, while it is neither a feasible nor reasonable alternative, the LA TIG will consider a natural recovery/No-Action Alternative both as a NEPA requirement and for the purpose of understanding and evaluating the resource trajectory that would occur if the Trustees took no further action in the Barataria Basin at this time.[4] The success of restoration undertaken in the Barataria Basin will be evaluated against this natural recovery/No-Action Alternative and not versus current conditions or pre-spill conditions.

A further discussion of the implications of a natural recovery/no-action scenario is presented in Section 3.2.4.

1.8 Coordination with Other Gulf Restoration Programs

As discussed in Section 1.5.6 of the Final PDARP/PEIS, the DWH Trustees are committed to coordination with other Gulf of Mexico restoration programs to maximize the overall ecosystem impact of DWH NRDA restoration efforts. During the course of the restoration planning process, the LA TIG has coordinated and will continue to coordinate with other DWH oil spill and Gulf of Mexico restoration programs, including the Resources and Ecosystems Sustainability, Tourist Opportunities, and Revived Economies of the Gulf Coast States Act (RESTORE Act) as implemented by the Gulf Coast Ecosystem Restoration Council (GCERC); the Gulf Environmental Benefit Fund (GEBF) managed by the National Fish and Wildlife Foundation (NFWF); in addition to other state and federal funding sources.

For example, provisions within the plea agreements direct a total of $2.544 billion to the GEBF over a five-year period to be used to support natural resource benefit projects in the Gulf States. In Louisiana, the GEBF funding was directed specifically to large-scale sediment diversion projects and to Barrier Islands. In the Barataria Basin, GEBF funding has been used to:

- Accelerate planning of river diversions in the Barataria Basin. This effort led to the prioritization of the Mid-Barataria Sediment Diversion over the Lower-Barataria Sediment Diversion for near-term implementation and helped quantify project benefits and potential effects on fisheries species. It also included an Independent Technical Review of the planning effort and a Diversion Advisory Panel.

[4]For this SRP, no action means strategic restoration planning for the Barataria Basin is not finalized or implemented at this time. However, while that means the preferred strategic alternative will not currently be implemented, the LA TIG anticipates that it may undertake further strategic or project-specific restoration planning within the Barataria Basin in the future. Rejection of the preferred alternative would not mean that future TIG-funded restoration projects are not pursued in the Barataria Basin, however no such projects are currently predictable.

- Engineer and design the Mid-Barataria Sediment Diversion at a cost of approximately $118 million, which is currently underway.
- Engineer and design, construct, and monitor Increment II of the Caminada Headland Restoration Project (BA-143) at a cost of approximately $146 million. To date, this is the largest restoration project ever undertaken by CPRA. Construction was completed in early 2017, but monitoring of the project is ongoing.
- Improve adaptive management of river diversions and barrier islands in the Barataria Basin through the implementation of the System Wide Assessment and Monitoring Program (SWAMP) and Barrier Island Comprehensive Monitoring (BICM) program.

In the Barataria Basin, funds from the RESTORE Act have been used to:

- Engineer and design the West Grand Terre Beach Nourishment and Stabilization Project at a cost of approximately $7.3 million. These barrier islands were heavily impacted by the April 2010 DWH oil spill. The West Grand Terre Beach Nourishment and Stabilization project, once fully implemented, will restore and enhance dune and back-barrier marsh habitat on the key barrier island of West Grand Terre to provide storm surge and wave attenuation, thereby addressing gulf shoreline erosion, diminished storm surge protection, and the subsidence of back barrier marshes.
- Develop a large-scale program to build the technical knowledge base needed to develop a plan that moves the nation towards a more holistic management scheme for the Lowermost Mississippi River, which seeks to both enhance the great economic value of the River while also elevating the importance of ecological maintenance and restoration of the landscape through which it flows at a cost of approximately $9.3 million. This planning effort will advance the science developed under the Louisiana Coastal Area (LCA) Mississippi River Hydrodynamic and Delta Management Study (MRHDMS) to form the foundation for any future river management analysis by creating an integrated science-based management strategy for the Lower Mississippi River to improve navigation, reduce flood risk, and provide for a more sustainable deltaic ecosystem.
- Implementation of the Jean Lafitte Canal Backfilling project at a cost of approximately $8.7 million. Canals constructed to access well sites and construct pipelines within Jean Lafitte National Historical Park and Preserve resulted in wetland loss, ground and surface water alteration, saltwater intrusion, soil compaction, and contributed to the introduction and spread of invasive species. The NPS will work on these remnant canals (16.5 miles) to restore to freshwater wetland and shallow water habitat by leveling spoil banks into canal ways.

The DWH oil spill Trustees have implemented several projects in the Barataria Basin beginning in 2014 through the Early Restoration process. These projects are as follows:

Early Restoration

- Louisiana Oyster Cultch Project: This project involves: (1) the placement of oyster cultch onto public oyster seed groups throughout coastal Louisiana, and specific to the Barataria Basin, along public oyster seed grounds in Hackberry Bay; and (2) the construction of an

oyster hatchery facility in Grand Isle. The Trustees received approximately $14.8 million for the implementation of this project.

- Lake Hermitage Marsh Creation Project: This project creates approximately 104 acres of new brackish marsh in the Barataria Basin using hydraulically dredged sediment from a borrow area in the Mississippi River. The 104-acre fill area was also planted with native marsh vegetation to accelerate the benefits of the project. The Trustees received approximately $13.2 million for the implementation of this project.
- Louisiana Outer Coast Project: This project involves the restoration of beach, dune, and back-barrier marsh habitats, as well as brown pelicans, terns, skimmers, and gulls at four barrier island locations in Louisiana. Specific to the Barataria Basin, this project includes the restoration of Chenier Ronquille and Shell Island. [The project also includes the restoration of North Breton Island (in the Breton Sound Basin) and Caillou Lake Headlands (in the Terrebonne Basin)]. The Trustees received approximately $318.4 million for the implementation of this entire project.

Post-settlement Restoration

- Barataria Basin Ridge and Marsh Creation - Spanish Pass Increment: This ridge restoration and marsh creation project is located in Plaquemines Parish. Spanish Pass is a natural historic tributary of the Mississippi River located west of Venice, Louisiana. If implemented, this project will restore approximately 120 acres of earthen ridge and approximately 1,134 acres of marsh. The Trustees have selected this project through the engineering and design phase and allocated $4.5 million for these restoration activities.
- Shoreline Protection at Jean Lafitte National Historical Park and Preserve: This project is located in the Jean Lafitte National Historical Park and Preserve. If implemented, this project will restore submerged aquatic vegetation (SAV) habitat by constructing breakwaters along the shorelines of Lake Cataouatche, Lake Salvador, and/or Bayou Bardeaux, and add material where needed to raise the elevation of the existing features to match the elevation of the new construction. Marsh creation features and SAV planting activities may be integrated into the project. The Trustees have selected this project through the engineering and design phase and allocated $2.3 million for these restoration activities.
- Queen Bess Island Restoration Project: The Barataria Basin is home to a limited number of bird rookeries. Queen Bess Island, located in Jefferson Parish, is one of the largest and most productive rookeries for a number of colonial nesting bird species, including brown pelicans. If implemented, this project will restore suitable colonial waterbird nesting and brood rearing habitat on the island from its current size of less than five acres to approximately 36 acres. The Trustees selected this project through the engineering and design phase and allocated $2.5 million for these restoration activities.

1.9 Public Involvement

1.9.1 Public Involvement in the PDARP/PEIS and Louisiana CMP

Public input is an integral part of NEPA, OPA, and the DWH oil spill restoration planning effort. The purpose of public review is to facilitate public discussion regarding the restoration project alternatives, allow the Trustees to solicit and consider public comment, and ensure that final plans consider relevant issues. The DWH Trustees conducted an extensive public outreach process as part of the PDARP/PEIS; that process is described more fully in Chapter 8 of the PDARP/PEIS. More discussion on public outreach and involvement can also be found in previous phases of DWH NRDA restoration, including in the Early Restoration Plans available at: http://www.gulfspillrestoration.noaa.gov/restoration/early-restoration.

Public engagement is also a vital element to the development of the Louisiana CMP. During the development of the 2017 CMP, CPRA combined opportunities to hear from coastal communities in person and online. Its outreach and engagement efforts initially began in 2014 and continued until the publication of the 2017 CMP. These public involvement efforts included a series of community meetings across coastal Louisiana. These community conversations, combined with the development of tools and materials to help communities understand available resiliency measures, placed coastal citizens and leaders in the unique position of active ownership in their future adaptation decisions. CPRA also hosted community meetings, in partnership with local community organizations that facilitated discussions to obtain feedback on draft lists of potential restoration projects. Throughout the planning process, CPRA hosted in-person meetings and webinars with the technical community to provide updates on different analytical aspects of the 2017 CMP. The feedback helped refine the technical analysis and approach. After the draft master plan was released, CPRA hosted four official public hearings to receive feedback and comments. Over 800 people attended these meetings, and CPRA used Facebook Live to broadcast the presentation, which reached more than 11,000 additional citizens. In addition to the public hearings, CPRA traveled across coastal Louisiana and participated in approximately 50 meetings, briefings, and presentations, meeting with thousands of stakeholders during the public comment period. In all, over 1,300 comments were received on the 2017 plan.

1.9.2 Public Involvement in the Development of the Barataria Basin SRP/EA

In late March 2017, the LA TIG published a NOS of Project Ideas, which requested the public's input regarding natural resource restoration opportunities in Louisiana, focused on the restoration type that restores and conserves wetlands, coastal, and nearshore habitats in the Barataria Basin (specifically restoration approaches identified in the PDARP/PEIS that can sustainably create, restore, and enhance coastal wetlands and restore and/or preserve Mississippi River processes). See: http://www.gulfspillrestoration.noaa.gov/2017/03/request-restoration-project-ideas-louisiana and http://la-dwh.com/2016_2017Restoration.aspx.

On April 28, 2017, the LA TIG published a NOI to prepare this SRP for the Barataria Basin in Louisiana, pursuant to the DWH PDARP/PEIS (82 FR 19659). The NOI explained that in this SRP the LA TIG will consider whether a combination of the Barataria Basin habitat restoration projects in the Draft 2017 CMP constitutes a preferred alternative, among other feasible

alternatives, for fulfilling OPA and the PDARP/PEIS intent for the trustees to address ecosystem-level injuries and to restore, rehabilitate, replace or acquire the equivalent of the injured wetlands, coastal, and nearshore habitat resources and services and compensate for interim losses of those resources from the DWH oil spill.

On December 20, 2017, the LA TIG released the Draft SRP/EA. The Draft SRP/EA was made available for public review and comment for 45 days as specified in the public notice published December 20, 2017 in the Federal and Louisiana Registers. A public meeting was held January 24, 2018 in New Orleans to present the Draft SRP/EA and hear public comments on the plan. The public comment period closed on February 5, 2018.

The LA TIG received 176 public comments on the Draft SRP/EA. These comments were received during the public meeting, submitted via web-based application, sent via e-mail, and mailed-in. While many public comments supported the preferred alternative, others highlighted concerns for adverse effects to a variety of resources. The LA TIG has considered those issues and decided to select several restoration projects for Phase II planning bearing in mind that those issues will require more detailed analysis and evaluation in Phase II planning and NEPA analysis. The public will have additional opportunities to participate and provide public input as part of those OPA and NEPA processes.

This Final SRP/EA was completed only after review, consideration, and response to public comments and this Final SRP/EA has been modified in response to those comments. Section 7 of this document provides a description of the comment analysis process, a summary of the public comments, and the LA TIG's responses to these comments.

1.10 Decisions to Be Made

This Barataria Basin SRP/EA explains to the public and decision-makers the information and process used by the LA TIG to identify the preferred strategic alternative and projects selected for Phase II restoration planning. The LA TIG is making two decisions in this SRP/EA to restore ecosystem-level injuries in the Gulf of Mexico through restoration of critical wetlands, coastal, and nearshore habitat resources and services in the Barataria Basin. First, the LA TIG selects a preferred alternative that relies on a suite of restoration approaches and techniques in the Barataria Basin, including large-scale sediment diversion to restore deltaic processes, marsh creation, and ridge restoration. Second, the LA TIG selects several projects for further evaluation and planning: the Mid-Barataria Sediment Diversion and one marsh creation increment within Large Scale Marsh Creation: Component E in Barataria Basin. The LA TIG also confirms its 2017 decision to move the Spanish Pass Increment of the Barataria Basin Ridge and Marsh Creation project forward for further evaluation and planning. These two decisions: selecting the preferred alternative and moving forward with restoration planning and NEPA review for the projects identified above are collectively referred to as the "Proposed Action."

The public, government agencies, and other entities have identified and will continue to identify potential restoration projects for consideration during the restoration planning process. Projects not selected for inclusion in the Barataria Basin SRP/EA preferred alternative or not carried forward at this time for Phase II restoration planning may continue to be considered for inclusion in subsequent restoration planning efforts.

1.11 Document Organization

This Barataria Basin SRP/EA is divided into the following sections:

Section 1 (Introduction): Introductory information and context for this document.

Section 2 (Restoration Planning Process): Background on the NRDA restoration planning process, summary of injuries to resources resulting from the DWH oil spill that the LA TIG intends to address in this Barataria Basin SRP/EA, and identification of restoration alternatives to address those injuries.

Section 3 (OPA and NEPA Evaluation of Alternatives): Evaluation of the restoration alternatives carried forward for further analysis under the OPA criteria and under NEPA.

Section 4 (Identification of Preferred Alternative and Projects Advanced for Future Restoration Planning): Identification of the preferred restoration alternative and identification of projects advanced for future restoration planning and evaluation in Phase II restoration plans,

Section 5 (Monitoring and Adaptive Management): Discussion of monitoring and adaptive management requirements for DWH oil spill NRDA restoration projects.

Section 6 (Compliance with Other Laws and Regulations): Compilation of additional federal and state laws that may apply to the projects proposed in this SRP/EA.

Section 7 (Public Comment on the Draft SRP/EA): Summary of public comments received on the Draft SRP/EA and LA TIG responses to these comments.

Section 8 (List of Preparers and Reviewers): Identification of individuals who substantively contributed to the development of this document.

Section 9(List of Repositories): A list of facilities that will receive copies of the Barataria Basin SRP/EA for review by the public.

Section 10 (Literature Cited).

2.0 Restoration Planning Process

This SRP/EA continues the restoration planning process begun prior to the settlement of the DWH oil spill litigation. Previous steps in this process included assessing the injury from the DWH oil spill, developing Early Restoration projects as part of the Early Restoration program undertaken jointly by the DWH Trustees and BP, and planning for programmatic restoration as part of the PDARP/PEIS. Upon completion of the settlement with BP, the DWH Trustees established the LA TIG to implement comprehensive DWH restoration planning in Louisiana.

2.1 Summary of Injuries Addressed in the SRP/EA

The LA TIG has elected to focus this SRP/EA on restoring wetlands, coastal, and nearshore habitat in the Barataria Basin, both because these habitats are critical components of the broader Gulf of Mexico ecosystem and because these resources suffered the greatest degree of oiling in Louisiana due to the DWH oil spill. This focus is consistent with the overall investment of NRDA restoration funding laid out in the PDARP/PEIS, and described as follows: "This investment of funds particularly focuses on restoring Louisiana coastal marshes as an essential element of the preferred alternative. Given both the extensive impacts to Louisiana marsh habitats and species and the critical role that these habitats play across the Gulf of Mexico for many injured resources and for the overall productivity of the Gulf (Gosselink and Pendleton, 1984), coastal and nearshore habitat restoration is the most appropriate and practicable mechanism for restoring the ecosystem-level linkages disrupted by this spill" (PDARP/PEIS, Section 5.1).

Chapter 4 of the PDARP/PEIS summarizes the injury assessment, which documented the nature, degree, and extent of injuries from the DWH oil spill to both natural resources and the services they provide. The paragraphs below summarize key relevant injury information from the PDARP/PEIS and subsequent studies that establish the nexus for restoration planning for these particular resources in the Barataria Basin.

As summarized in the PDARP/PEIS, the DWH spill created over 1,100 km of wetland oiling Gulf-wide, and approximately 95% of this marsh oiling occurred in coastal Louisiana (e.g., PDARP/PEIS, Table 4.6.2; Nixon et al., 2015). Within Louisiana, the majority of the "heavier" and "heavier persistent" oiling was in the Barataria Basin (Figure 2). This heavy oiling was primarily in marshes dominated by *Spartina alterniflora* and *Juncus roemerianus* (Lin and Mendelssohn, 2012; Silliman et al., 2012; Visser et al., 1998). These marshes provide critical habitat for estuarine dependent species throughout the Gulf of Mexico.

Within the Barataria Basin, relatively "weathered" emulsions of crude oil coated the productive marsh edge, resulting in extensive mortality of coastal vegetation in these environments (e.g., Hester et al., 2016; Lin and Mendelssohn, 2012; Lin et al., 2016; Silliman et al., 2012; Zengel et al., 2014, 2015). The impacts of this oiling were documented across multiple trophic levels within the Barataria Basin. For example, growth rates of juvenile brown and white shrimp along this oiled marsh edge were reduced by up to 50% compared to those collected near shorelines that did not experience oiling (e.g., Rozas et al., 2014; van der Ham and de Mutsert, 2014). Growth rates of red drum along heavily oiled marsh shorelines were also reduced by approximately 50% in 2010

relative to un-oiled shorelines, and these reduced growth rates persisted through at least 2013 (e.g., Powers and Scyphers, 2015). The PDARP/PEIS estimated that 35% of bottlenose dolphins in Barataria Bay were killed as a result of the oil spill, and 46% of female dolphins suffered from reproductive failure. Numerous other examples of impacts to specific species and resources, as described in the PDARP/PEIS, demonstrate that the DWH oil spill created an ecosystem-level injury to the Gulf of Mexico that necessitates an ecosystem-level restoration strategy (e.g., PDARP/PEIS, Ch. 4).

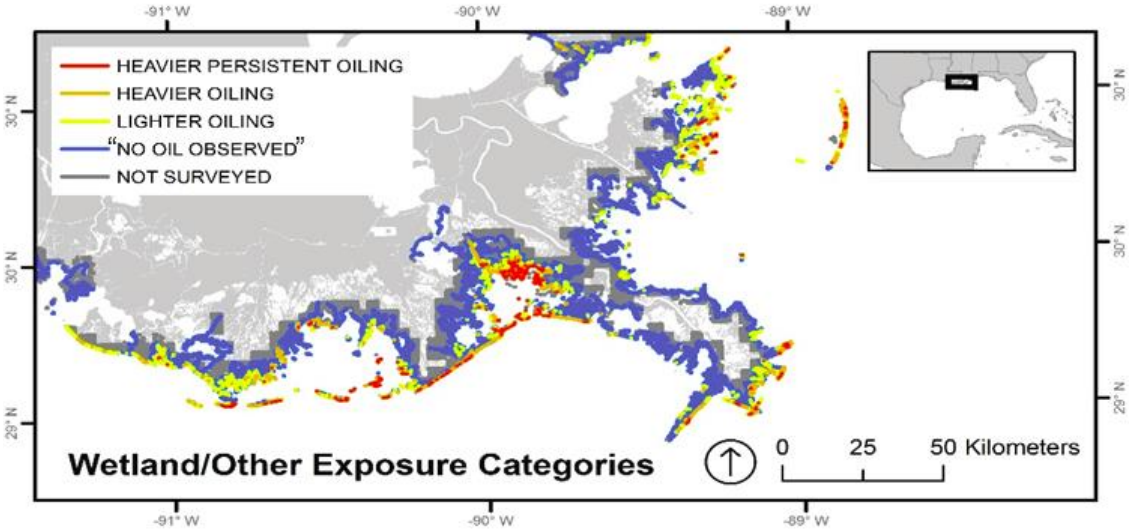

Figure 2. The ecosystem-level injury from the DWH oil spill occurred across all trophic levels, and was most severe in the Barataria Basin (Source: PDARP/PEIS, Figure 4.6-9)

In addition to providing habitat for estuarine-dependent species, the marsh grasses *Spartina alterniflora* and *Juncus roemerianus* also help to maintain this habitat by protecting the marsh edge from wave-induced erosion (Angelini et al., 2011; Baustian et al., 2012; Kirwan and Megonigal, 2013; Leonardi et al., 2016): the aboveground plant stems slow tidal and wave energy (Li and Yang, 2009; Marion et al., 2009), while the belowground root biomass increases soil shear strength and resistance of the soil to erosion along the marsh edge (Graham and Mendelssohn, 2014; Sasser et al., 2013). Because these marsh plants are critical to maintaining the resilience of coastal marshes, the extensive oiling and death of marsh vegetation in the Barataria Basin created an acceleration of land loss following the spill (e.g., Silliman et al., 2012; McClenachan et al., 2013; Zengel et al., 2015; Silliman et al., 2016; Turner et al., 2016; see Table 2). Although moderately-oiled marshes have shown vegetative recovery since the spill (Lin et al., 2016; Michel and Rutherford, 2014; McClenachan et al., 2013; Zengel and Michel, 2013), many of the more heavily-oiled shorelines have either recovered slowly or were completely lost to erosion (Lin and Mendelssohn, 2012; McClenachan et al., 2013; Lin et al., 2016; Silliman et al., 2012; Silliman et al., 2016). Accelerated erosion due to the spill resulted in a permanent loss of coastal wetlands over large portions of the Barataria Basin that can only be addressed through restoration.

Table 2
Comparisons of pre- and post-spill erosion rates from published studies.
The majority of the observations compiled by all authors are from the Barataria Basin.

Erosion Rate	Time Period	Source
Reference sites – 0.8 – 1.3 m yr^{-1}	Post- DWH spill (Spring 2010 – Fall 2012)	Zengel et al. 2015
Heavily oiled sites – 2-3 times higher than reference	Post- DWH spill (Spring 2010 – Fall 2012)	Zengel et al. 2015
Reference sites – 1.38 m yr^{-1}	7 – 22 months after DWH spill (October 2010 – January 2012)	Silliman et al. 2012
Oil-impacted sites – 3.0 m yr^{-1}	7 – 22 months after DWH spill (October 2010 – January 2012)	Silliman et al. 2012
Low-oil sites – 1.0 m yr^{-1}	8 – 29 months after DWH spill (November 2010 – August 2012)	McClenachan et al. 2013
High-oil sites – 1.33 m yr^{-1}	8 – 29 months after DWH spill (November 2010 – August 2012)	McClenachan et al. 2013
Average enhanced erosion in island width and length: Unoiled islands - 1.53 m yr^{-1}	1 – 33 months after DWH spill (May 2010 – December 2012)	Turner et al. 2016
Oiled islands – 3.07 m yr^{-1}	1 – 33 months after DWH spill (May 2010 – December 2012)	Turner et al. 2016
No oiling - 1.0 ± 0.3 m yr^{-1}	14 – 42 months after the DWH spill (Spring 2011 – Fall 2013)	Silliman et al. 2016 (all sites)
90-100% plant stem oiling – 3.3 ± 0.3 m yr^{-1}	14 – 42 months after the DWH spill (Spring 2011 – Fall 2013)	Silliman et al. 2016 (all sites)
No oiling - 1.4 ± 0.5 m yr^{-1}	7 – 42 months after the DWH spill (Fall 2010 – Fall 2013)	Silliman et al. 2016 (Louisiana sites)
90-100% plant stem oiling – 4.0 ± 1.4 m yr^{-1}	7 – 42 months after the DWH spill (Fall 2010 – Fall 2013	Silliman et al. 2016 (Louisiana sites)
Non-oiled sites – 0.53 m^2 m^{-1} y^{-1}	Pre-spill (2006 - 2010)	Beland et al. 2017
>60% oiled sites – 0.66 m^2 m^{-1} y^{-1}	Pre-spill (2006 - 2010)	Beland et al. 2017
Non-oiled sites – 0.71 m^2 m^{-1} y^{-1}	Post-oiling (2010 - 2013)	Beland et al. 2017
>60% oiled sites – 1.74 m^2 m^{-1} y^{-1}	Post-oiling (2010 - 2013)	Beland et al. 2017
Non-oiled sites – 0.63 m^2 m^{-1} y^{-1}	Post-spill (2013 – 2016)	Beland et al. 2017
>60% oiled sites – 0.81 m^2 m^{-1} y^{-1}	Post-spill (2013 – 2016)	Beland et al. 2017

2.2 Relationship of the Barataria Basin SRP/EA to the CMP

The LA TIG considered CMP projects, among other projects submitted in response to the NOS, in identifying the project examples included in the strategic restoration alternatives evaluated in this SRP/EA because the CMP is the State of Louisiana's publicly vetted and scientifically founded approach to coastal restoration. The CMP is an approach to creating a more sustainable coastal Louisiana landscape and includes the goal of promoting sustainable ecosystems (see http://coastal.la.gov/our-plan/2017-coastal-master-plan/overview/ http://coastal.la.gov/our-plan/2017-coastal-master-plan/overview/), which is compatible with the overall PDARP/PEIS goals. Through this SRP/EA, the LA TIG focused the universe of CMP projects down to a suite of wetlands, coastal, and nearshore habitat restoration example projects that are in the Barataria Basin and that are consistent with the Restoration Goals identified in the PDARP/PEIS. Projects undertaken in the Barataria Basin are expected to benefit resources within the basin and in the broader Gulf of Mexico ecosystem.

For 2017, CPRA used the New Project Development Program to gather new project ideas to be evaluated for the CMP (see http://coastal.la.gov/wp-content/themes/cpra/images/pdfs/%20newProjectDevelopmentProgram_April2015.pdf). In total, over 750 new project ideas were considered for inclusion in the 2017 CMP. The 2017 CMP is consistent with and supportive of many aspects of other DWH oil spill and Gulf of Mexico restoration programs, including the Gulf Coast Ecosystem Restoration Task Force's Regional Ecosystem Restoration Strategy, the Resources and Ecosystems Sustainability, Tourist Opportunities, and RESTORE Act multi-year implementation plan, the NRDA PDARP/PEIS, and the terms of the NFWF GEBF.

2.2.1 CMP Predictive Models

Louisiana's CMP was developed using a suite of predictive models that provide a holistic understanding of the coastal environment over the next 50 years. To estimate restoration outcomes, the CMP used models that predict how land would change throughout the coast—where land would accrete and where it would disappear. These models also examined how water moves through the coastal system, as well as how changing salinity trends would affect vegetation, habitat for key species, and ecosystem outcomes. Collectively, these predictive models developed for the CMP assessed how Louisiana's coastal landscape may change over the next 50 years if no further action is taken. For comparison, CPRA then assessed how the coastal ecosystem could change if the identified restoration projects were constructed.

The State of Louisiana has made a substantial investment in the development and refinement of these predictive models; the predictive models used in the 2017 CMP involved the work of over 75 technical experts. Key improvements to the models from those used for the 2012 CMP included development of new process-based algorithms for sediment distribution, integration of landscape and ecosystem model codes into a single common framework, and increased resolution of model grids for eco-hydrology and risk assessment. The landscape and risk assessment models were designed to work together, following the precedent set by earlier State of Louisiana planning efforts, which allows outputs from the landscape models to feed directly into the risk assessment models. The modeling used in the CMP process and the linked models is a significant technical achievement in the systems approach, resulting in an increased number of subjects

evaluated. The LA TIG uses the results of those models to estimate expected outcomes for comparative value of projects and alternatives in the subsequent sections. The modeling is an integral part of the Monitoring and Adaptive Plan (Section 4.0).

2.2.2 CMP Future Environmental Scenarios

Many factors that will have a profound effect on the future of Louisiana's coast cannot be easily predicted or controlled with precision and accuracy. These include subsidence and sea level rise, the ecosystem effects of climate change, changes in rainfall patterns, and storm frequency and intensity. Predictions of relative sea level rise were central to CPRA's analysis, given coastal Louisiana's vulnerability to increased frequency, amplitude, and duration of flooding and the sensitivity of its habitats. To account for these factors when developing the CMP, CPRA worked with experts to develop three different sets of assumptions or environmental scenarios to represent a range of possible future conditions: low, medium, and high. These low, medium, and high environmental scenarios represent a range of possible future conditions for Louisiana to consider.

Modeling results show an increase in flood depths and habitat loss over time regardless of scenario, with the high environmental scenario representing the greatest magnitude of habitat loss and flood risk. The 2017 CMP determined that formulating alternatives based on the high environmental scenario and then experiencing less severe conditions would result in less regret than other approaches. As a result, the majority of projects selected for the 2017 CMP are based on the high environmental scenario. The outcomes of the high scenario are carried forward for consideration in the SRP/EA (e.g., estimates of acres of habitat built or maintained by potential projects are based on the high environmental scenario). A detailed explanation of CPRA's process and methodology for evaluating environmental drivers can be found in the 2017 CMP, Appendix C, *Modeling*, Chapter 2, *Future Scenarios*: http://coastal.la.gov/our-plan/2017-coastal-master-plan/.

2.3 Development of Strategic Alternatives

Because this plan serves as an SRP/EA for the Barataria Basin, the Trustees developed a process which included the development of strategic alternatives that could be used to restore wetlands, coastal, and nearshore habitat in the Barataria Basin, the screening of individual projects that pertain to the different strategic alternatives, and the identification of projects to carry forward to Phase II restoration plans for further planning and evaluation under OPA and NEPA. The strategic alternatives are comprised of specific combinations of PDARP/PEIS restoration approaches and techniques. To aid in concretely considering each of these approaches and techniques, the LA TIG has also identified projects that pertain to each alternative. To further the goals of this SRP/EA, the LA TIG may choose to carry forward these projects, or similar projects, now or in the future, for further development and evaluation in Phase II restoration plans.

The LA TIG adopted the following process to develop strategic alternatives for this SRP/EA:

- **Step one**: The LA TIG identified which restoration approaches and techniques from the PDARP/PEIS are most compatible with restoring wetlands, coastal, and nearshore habitat in the Barataria Basin.

- **Step two**: The LA TIG compiled a list of potential projects submitted in response to the late March 2017 Notice of Solicitation to the federal and state project portals. The LA TIG also did an initial pre-screening of projects from the Final 2017 Louisiana CMP (see http://coastal.la.gov/our-plan/2017-coastal-master-plan/planning-process/projects/) to identify CMP projects of potential geographic and ecological relevance to this SRP/EA (e.g., screening out non-structural risk reduction projects or projects not located in the Barataria Basin). The combined list of projects submitted in response to the NOS plus projects pre-screened from the CMP were then carried forward to step three.
- **Step three**: The LA TIG screened the list of projects identified in step two using a set of screening criteria focused on applicability to this SRP/EA.
- **Step four**: The LA TIG developed strategic restoration alternatives that logically combine restoration approaches and techniques exemplified by the projects that passed through the screening of step three.

The goal of this process was to identify a set of alternatives that provides a reasonable range of options for compensating the public for injuries to Louisiana's wetlands, coastal, and nearshore habitat in the Barataria Basin and to the injured resources that benefit from these habitats. Further, this screening process was designed to identify wetlands, coastal, and nearshore habitat restoration project examples that support the Trustees' restoration goals for ecosystem-level injuries caused by the DWH spill. The phased and sequential alternatives development process is described in more detail below.

2.3.1 Step 1: Identification of Relevant Restoration Approaches and Techniques

In developing strategic restoration alternatives to address the ecosystem-level injury in the Gulf of Mexico and the current state of ecosystem decline in the Barataria Basin, the LA TIG considered the restoration approaches identified in the PDARP/PEIS within the restoration type Wetlands, Coastal, and Nearshore Habitats. These approaches include the following:

- Create, restore, and enhance coastal wetlands.
- Restore and preserve Mississippi-Atchafalaya River processes.
- Restore oyster reef habitat.
- Create, restore, and enhance barrier and coastal islands and headlands.
- Restore and enhance dunes and beaches.
- Restore and enhance submerged aquatic vegetation.

As described in the PDARP/PEIS, the coastal wetlands within Barataria Basin provide the foundational habitat for the Barataria Basin ecosystem, support resources within the Barataria Basin and throughout the Gulf of Mexico, and were among the most heavily oiled parts of the Gulf Coast shoreline. These wetlands are also experiencing extremely high rates of land loss as a result of declines in sediment supply from the Mississippi River, combined with subsidence and eustatic sea level rise. To restore for these injuries, while ensuring that the identified restoration

approaches are sustainable, the LA TIG focused this SRP/EA on the first two approaches from the list above: creating, restoring and enhancing coastal wetlands; and restoring and preserving Mississippi-Atchafalaya River processes. These approaches provide the most direct link to restoring, creating, and maintaining coastal wetland habitat in the Barataria Basin. The remaining restoration approaches are not incorporated into this strategic restoration plan at this time for the following reasons:

- Restore oyster reef habitat
    - The Trustees have previously restored oyster reef habitat in the Barataria Basin as part of the Early Restoration Phase I Louisiana Oyster Cultch Project and have additional resources available to support potential future oyster reef projects through the direct allocation to the oyster resource. Thus, direct restoration of oyster reef habitat is not a focus of this SRP/EA.
- Create, restore, and enhance barrier and coastal islands and headlands
    - The Trustees have previously restored barrier island and headland habitat in the Barataria Basin as part of the Early Restoration Phase III Louisiana Outer Coast Restoration Project. Because of that large investment ($318 million in DWH funding), and the support of barrier island restoration by the GEBF, the Trustees have not incorporated additional barrier and coastal island and headlands habitat into this SRP/EA.
- Restore and enhance dunes and beaches
    - The Trustees have previously restored and enhanced dunes and beaches as part of their work on restored barrier island and headland habitat in the Barataria Basin, as described above. Because of that large investment ($318 million in DWH funding), and the support of barrier island restoration by the GEBF, the Trustees have not incorporated additional dunes and beaches restoration into this SRP/EA.
- Restore and enhance submerged aquatic vegetation
    - Direct SAV restoration in the Barataria Basin beyond that being contemplated at Jean Lafitte National Historical Park and Preserve is not anticipated to provide a degree of ecosystem benefit substantial enough to address injured wetlands, coastal, and nearshore habitat at the ecosystem level. Thus, direct SAV restoration is not a focus of this SRP/EA.

Within the two selected restoration approaches, the PDARP/PEIS identified a series of potential restoration techniques. These techniques, spanning both restoration approaches, were as follows (PDARP/PEIS, Appendix 5.D):

- Create or enhance coastal wetlands through placement of dredged material.
- Backfill canals.
- Restore hydrologic connections to enhance coastal habitats.

- Construct breakwaters.
- Controlled river diversions.

2.3.2 Steps 2 and 3: Compilation of Projects and Initial Screening Process

Trustee Council SOP Section 9.4.1.4 provides that "[t]he TIGs and individual Trustees within the TIG will develop project ideas and will consider relevant project ideas submitted by the public. The TIGs will screen initial project ideas to hone in on potential projects and alternatives that will continue to be developed for consideration. Screening will adhere to project selection criteria consistent with OPA regulations (15 C.F.R. § 990.54), the PDARP/PEIS, and any additional evaluation criteria established by a TIG and identified in a restoration plan or public notice."[5]

To begin the screening process for restoration project examples, the LA TIG assembled a master database of potential restoration projects relevant for the range of alternatives considered. Projects were compiled from those submitted in response to the NOS to the federal and state project portals. In addition, projects selected for inclusion in the Final 2017 Louisiana CMP went through a pre-screening process for geographic and ecological relevance to this SRP/EA. This resulted in 37 potential example projects being screened. The screening criteria used were as follows.

2.3.2.1 Geographic Applicability

The LA TIG selected the Barataria Basin as the geographic scope for this SRP/EA because wetlands in the Barataria Basin experienced some of the heaviest and most persistent oiling and associated response activities from the DWH oil spill. Only example projects that are located in the Barataria Basin or directly benefit wetlands, coastal, or nearshore habitat in the Basin were considered for this SRP/EA.

2.3.2.2 PDARP/PEIS Programmatic and Restoration Type Goals and Objective

The OPA regulations allow trustees to establish additional incident-specific evaluation and selection criteria for alternatives and restoration projects (15 C.F.R. § 990.54). For this incident, the DWH Trustees have determined that the action alternatives and subsequent restoration plans and projects must also be consistent with the goals outlined in the PDARP/PEIS Section 5.3.1, Programmatic Trustee Goals, and with the restoration types described in Section 5.5, Alternative A: Comprehensive Integrated Ecosystem Restoration (Preferred Alternative).

2.3.2.3 Initial OPA Eligibility Screening

The intent of the initial eligibility screen was to identify those example projects that could reasonably be expected to provide substantial ecosystem benefits and that have a clear nexus to injury that occurred as a result of the DWH oil spill. The initial eligibility screen looked primarily

[5] Available at https://pub-*DWH*datadiver.orr.noaa.gov/*DWH*-ar-documents/1184/*DWH*-AR0308710.pdf.

at the extent to which each example project is expected to meet the Trustees' goals and objectives in returning the injured natural resources and services to baseline and/or compensating for interim losses. Under OPA, alternatives should demonstrate a clear relationship to the resources and services injured. Although the OPA and NEPA analysis in this plan focuses on the strategic alternatives presented in Section 3.0, the Trustees specifically select three projects for further restoration planning in project-specific Phase II restoration plans and note that other projects identified in this plan may also be carried forward under OPA in the future.

2.3.2.4 Additional Considerations

In addition to the screening criteria outlined above, in screening potential example projects for the SRP/EA, the LA TIG also considered the following criteria:

- Does the project contribute to restoring for ecosystem-level injuries? Not only does the project need to be located in the Barataria Basin and/or provide benefit to its wetlands, coastal, and nearshore habitats, but it also needs to support the ecosystem-level goals, as described in the PDARP/PEIS Preferred Alternative A.

2.3.3 Step 3: Results of Initial Screening

Table 3 describes the 37 potential example projects considered under this Barataria Basin SRP/EA and the outcome of the initial screening process. In the project ID code given in Table 3, "Fed-" denotes that the project was submitted to the Federal Project Portal, "LA-"denotes that the project was submitted to the Louisiana Project Portal, and "MP" indicates that the project was included in the 2017 CMP.

The screening process identified 13 projects that meet the criteria set out by the LA TIG (Table 4):

- Mid-Barataria Sediment Diversion
- Ama Sediment Diversion
- Large-Scale Marsh Creation – Component E
- Lower Barataria Marsh Creation – Component A
- Grand Bayou Ridge Restoration
- Bayou Eau Noire Ridge Restoration
- Adams Bay Ridge Restoration
- Red Pass Ridge Restoration
- Lake Hermitage Shoreline Protection
- East Snail Bay Shoreline Protection
- West Snail Bay Shoreline Protection
- Bayou Perot Shoreline Protection
- Spanish Pass Increment of the Barataria Basin Ridge and Marsh Creation

Table 3
Potential Example Projects Considered in Barataria Basin SRP/EA and Initial Screening Results

Project ID	Project Name	Brief Project Description	Initial Screening Results
Fed-12909	Quantify the efficacy of fish descender devices on reducing discard mortality in red snapper and other reef fishes	This project will make use of SeaQualizer fish descender devices in a sample of charter for-hire fisheries across the Gulf to study the effects of barotrauma on released red snapper and reef fishes, and to quantify the reduction in fish mortality obtained in different species and environmental conditions by employing conventional or acoustic tags to estimate immediate and delayed mortality of fish after return-to-depth versus surface release.	Screened out because project is not located in the Barataria Basin or does not focus on restoring wetlands, coastal, and nearshore habitats in the Barataria Basin
Fed-12914	Habitat mapping and identification of species abundance and distribution for deep-water coral communities inside and outside the De Soto Canyon area to clarify genetic connectivity among populations and guide restoration priorities	This project will deploy side-scan sonar from research vessels to characterize mesophotic and deep-sea benthic habitats for different coral communities inside and outside the De Soto Canyon area. This information will be used to develop high-resolution habitat maps and habitat suitability models for various coral communities that can advance knowledge on coral distribution and essential habitat features for these populations.	Screened out because project is not located in The Barataria Basin or does not focus on restoring wetlands, coastal, and nearshore habitats in the Barataria Basin
Fed-12987	Gulf MetaCode (GMeC): Next Gen Census and Long-Term Monitoring of Florida's Gulf Biodiversity	The two objectives of this project are: 1) to produce a DNA sequence library to identify species, and 2) to use this resource and new technology to rapidly assess biodiversity of Gulf communities at standardized spatial and temporal intervals.	Screened out because project does not focus on restoring wetlands, coastal, and nearshore habitats in the Barataria Basin
Fed-12986	Marsh loss in Barataria Bay due to the Deepwater Horizon Oil Spill	The goal of this proposed project is to fully document marsh degradation and loss due to DWH oil in Barataria Bay from 2010 to 2016, and to chronic and storm erosion.	Screened out because project does not directly restore for ecosystem level injuries
Fed-12985	Development of Tools to Operate the Mid-Barataria Sediment Diversion for Maximum Sediment Delivery and Minimum Freshwater Input	This project intends to (1) provide tools for informing the timing, magnitude and duration of diversion operations to maximize sediment delivery with minimal freshwater influx, and (2) provide baseline data on flux of material materials through the basin to help assess the diversion's impact to these fluxes and the spatial extent of these fluxes once the diversion becomes operational.	Screened out because project does not directly restore for ecosystem level injuries
Fed-12982	Ecological responses to freshwater diversions in Barataria Bay and surrounding areas	The study proposes to assess estuarine health at sites near Fort Saint Phillip where passive breaches in the Mississippi River levy have resulted in large influxes of freshwater into the lower sections of Breton Sound. Biological, chemical and physical (habitat) characteristics will be measured in response to the long-term influx of freshwater and sediment from the Mississippi River, as opposed to sites isolated from any direct river water influx.	Screened out because project does not directly restore for ecosystem level injuries

Project ID	Project Name	Brief Project Description	Initial Screening Results
Fed-12980	Predicting Oiled-Marsh Erosion through Integration of Field Observations, Hydrodynamic Modeling and Remote Sensing of Coastal Wetlands	The goal of the proposed project is to synthesize and integrate field observations, numerical modeling results, and remote sensing data aimed at developing a reliable model for the prediction of oiled-marsh edge erosion, which will serve as a useful tool for assessing the long-term resilience of coastal marshes in Louisiana and beyond.	Screened out because it does not directly benefit the Barataria Basin
Fed-12921	Expand monitoring and research efforts, and develop and implement a best fishing practices program at sentinel sites to enhance conservation of shallow-, mid-, and deep-water coral communities in the Gulf of Mexico	This proposed project would expand monitoring and research activities at selected coral sentinel sites at various depths across the northern Gulf of Mexico to collect needed information on the status and condition of both injured and healthy (reference) coral communities.	Screened out because it is not located in the Barataria Basin or does not directly benefit the Barataria Basin
Fed-12976	Revision of the seagrass guidelines document: a support tool for restoration of seagrass impacts in the Gulf of Mexico	The 1998 seagrass guidelines document has emerged as a foundation reference guide for use by regulatory agencies and applicants in the Gulf of Mexico (GOM) and worldwide. However, this document is now significantly out of date (approaching 20 years), and a revision is required. For the revision, emphasis will be placed on “how-to” guidance, including addressing frequently asked questions of policy, planning, methods, monitoring, and evaluation of success.	Screened out because it is not located in the Barataria Basin or does not directly benefit the Barataria Basin
Fed-12967	Migratory Species Studies	This project should: i. Assess the threats to species while migrating (along their pathways) in the Gulf of Mexico; ii. Develop an optimized habitat portfolio using GIS and migratory connectivity models that identify the essential habitats to maintain migratory species populations throughout their life cycle and to guide habitat restoration and protection; and iii. Support technological advancements in the development of biological tracking and oceanographic monitoring networks, such as acoustic monitoring networks, gliders including the development of migratory movement tracking networks and infrastructure across the Gulf of Mexico.	Screened out because it is not located in the Barataria Basin or does not directly benefit the Barataria Basin
Fed-12969	Assessing the Ecological Connectivity of Gulf Environments	This project will identify and prioritize protected waters and nearshore environments (e.g., bays, estuaries, etc.) that contribute in maintaining populations of offshore endangered, commercial, and recreationally important species.	Screened out because it is not located in the Barataria Basin or does not directly benefit the Barataria Basin
Fed-02970	Nutrient Reduction Pilot Projects in the Mississippi Valley	This project would create a large-scale pilot project on a Mississippi tributary in Louisiana or Mississippi to test a broad range of strategies for nutrient reduction that could be measured, described, and then be replicated elsewhere.	Screened out because project does not focus on restoring wetlands, coastal, and nearshore habitats in the Barataria Basin

Project ID	Project Name	Brief Project Description	Initial Screening Results
Fed-12965	Modification of the Pearl River Navigation Structure to Restore Spawning Habitat for Gulf Sturgeon	The primary goal for this project is to increase the number of Gulf sturgeon in the Pearl River Basin. The objective is to remove two low head dams associated with the USACE Pearl River Navigation Project (PRNP) that currently block access to sturgeon spawning habitat and restrict reproductive success.	Screened out because it is not located in the Barataria Basin or does not directly benefit the Barataria Basin
Fed-11973	Dock and Sea Wall Reef Ball® Habitat	For Phase 1 of this project, Reef Innovations would provide a crew to survey public docks and piers determine suitability for the individual areas for enhancement. Reef innovations will develop a site plan for each deployment based on the site criteria and deploy the units to maximize structural protection and species recruitment. Phase II, expands this program to private property owners following the criteria used for public docks and seawalls.	Screened out because it is not located in the Barataria Basin or does not directly benefit the Barataria Basin
Fed-11967	Channel Marker Reef Ball Micro-Habitats	Deployment of a Reef Ball® on each channel marker would provide increased micro habitat for finfish and invertebrate recruitment throughout the Gulf of Mexico. For this project, a crew of 3 workers could work their way across the state or region installing the micro habitats over a period of 3 to 10 years, or the units and deployment training could be supplied to the individual county for implementation.	Screened out because it is not located in the Barataria Basin or does not directly benefit the Barataria Basin
Fed-11965	Reef Innovations Reef Ball Regional Production Sites	The Reef Ball Regional Production Site is designed, to create local jobs, and reduce the overall cost of production and delivery of reef modules thus becoming more cost efficient. Rather than numerous projects having to handle the purchases of product, they would be allotted a portion of the production from the RPS.	Screened out because it is not located in the Barataria Basin or does not directly benefit the Barataria Basin
Fed-12837	Pelagic Longline Gear and Vessel Transition Program in the Gulf of Mexico	The program will provide fishermen with selective alternatives to PLL, including green stick gear and swordfish buoy gear, as well as training and financial assistance to help them learn to fish and optimize application of these gears in the Gulf of Mexico.	Screened out because project does not focus on restoring wetlands, coastal, and nearshore habitats in the Barataria Basin
Fed-12917	Large-scale tagging program to understand post-release mortality, migration, and movement in highly migratory and coastal migratory fish species	This project will investigate the level of post-release mortality from commercial and recreational fisheries in HMS and CMS by using pop-up satellite tags (i.e., survivorship tags) specifically developed to study species survival after release from fishing gears. Species targeted for this effort will be adult individuals of bluefin tuna, yellowfin tuna, and blue marlin for HMS, and mahi-mahi for CMS.	Screened out because it is not located in the Barataria Basin project or does not focus on restoring wetlands, coastal, and nearshore habitats in the Barataria Basin

Project ID	Project Name	Brief Project Description	Initial Screening Results
Fed-12910	Targeted research to assess habitat-specific invasive lionfish distribution, interactions with native reef fishes, and effective mitigation measures	This project will make use of sonar technologies (e.g., side-scan, multi-beam, or split-beam) and high-resolution underwater video-cameras (e.g., towed cameras or ROVs) that can be deployed from research or charter fishing vessels to survey selected natural reef habitats in the Gulf of Mexico. This information will be used to understand and model the spatial overlap of lionfish with native reef fishes, which could be employed to estimate the impact of lionfish on reef fish distribution, ecology, and population dynamics.	Screened out because it is not located in the Barataria Basin or does not directly benefit the Barataria Basin
Fed-12913	Open water restoration for nesting fisheries, water birds, and foraging waterfowl	The primary goal is to re-create marsh habitat in the open water areas and nourish adjacent deteriorating marsh. This project will afford the communities along the north shore, such as Lacombe, storm surge protection. The area can support a large number of wintering waterfowl, including horned grebe and common loon, various gulls, terns, herons, egrets, and rails. The area has been designated as an Important Bird Area by the American Bird Conservancy.	Screened out because it is not located in the Barataria Basin or does not directly benefit the Barataria Basin
LA-1	Protection of Natural Resources in the Louisiana Coastal Zone: Risk Assessment of Oil & Gas Wells in Barataria Basin	The project involves analyzing risk from abandoned, orphaned, and currently active wells by quantifying the probabilities of releases, along with the ongoing and potential future ecological and human health and safety impacts of releases. The well risk assessment will be synthesized into a decision-making tool that can be applied in the future as existing producing wells are plugged and abandoned, or as needed for future conditions.	Screened out because project does not directly restore for ecosystem level injuries in the Barataria Basin
LA-2	Synthesis of environmental data in Barataria Basin to assess restoration outcomes	The project entails three interrelated tasks, described more fully below: 1) develop and apply an approach for integrating project-level monitoring identified by the LA TIG (or others, as appropriate) for Mississippi River diversions into the existing SWAMP network or other monitoring programs within the region; 2) develop analytical methods for evaluating restoration outcomes across resources and habitats that can be used to evaluate project performance, status, and trends at multiple scales; and 3) develop methods for synthesizing and communicating information as part of the adaptive management feedback loop to inform project-level operations, as well as future project planning and implementation.	Screened out because project does not directly restore for ecosystem level injuries

Project ID	Project Name	Brief Project Description	Initial Screening Results
LA-3	Informing Barrier Island and Dune Habitat Restoration by Quantifying Dune Vegetation and Elevation Linkages and Evolution	The project will (1) acquire data and develop monitoring techniques that can be incorporated in the SWAMP; and (2) create methods of predicting dune evolution that can be incorporated in and/or complement tools within the Louisiana Integrated Compartment Model and planted vegetation, on island resiliency and sustainability; and considerations of how characteristics of the full restoration template (e.g., beach width) influences the dune growth and resiliency.	Screened out because it is not located in the Barataria Basin or does not directly benefit the Barataria Basin
LA-4	Adaptive Management with the Native Southern Ribbed-Mussel for a Sustainable Coast	In this project proposal idea, site selections for such artificial reefs and natural shoreline locations will be made cooperatively with the state, with one such location near #LA-0008. The PIs will develop and set reef structures, culture and set the mussels, monitor survival and success at colonization, growth, and nekton recruitment over two years.	Screened out because it is not located in the Barataria Basin or does not directly benefit the Barataria Basin.
MP 001.D1.101	Ama Sediment Diversion	Sediment diversion into Upper Barataria near Ama to provide sediment for emergent marsh creation and freshwater to sustain existing wetlands, 50,000 cubic feet per second (cfs) capacity (modeled at 50,0000 cfs when the Mississippi River flow equals 1,000,000 cfs; open with a variable flow rate calculated using a linear function from 0 to 50,000 cfs for river flow between 200,000 cfs and 1,000,000 cfs, diverts exactly 50,000 cfs when the Mississippi River flow is 1,000,000 cfs; and open with a variable flow rate [larger than 50,000 cfs, estimated using linear extrapolation] for river flow above 1,000,000 cfs. No operation below 200,000 cfs).	Carried forward for analysis because it is located in/benefits the Barataria Basin, is included as a restoration approach in the PDARP/PEIS and NOS (Restore and Preserve Mississippi-Atchafalaya River Processes), has a clear nexus to injured resources that can benefit from Wetlands, Coastal, and Nearshore Habitats restoration, and is consistent with the additional considerations.
MP 002.D1. 102	Mid-Barataria Sediment Diversion	Sediment diversion into Mid-Barataria near Ironton to build and maintain land with a 75,000 cfs maximum capacity with a base flow of 5,000 cfs (if head differential allows). Operated at a Mississippi River Trigger of 450,000 cfs, on/off, and at the base flow below 450,000 cfs. Diversion flow is on the order of 30,000 to 40,000 cfs at the Mississippi River Trigger of 450,000 cfs and the diversion flow peaks at 75,000 cfs at 1,000,000 cfs in the Mississippi River. The diversion uses gravity or open channel flow; thus, the maximum variable flows will be based on head differential between the Mississippi River and Barataria Basin.	Carried forward for analysis because it is located in/benefits the Barataria Basin, is included as a restoration approach in the PDARP/PEIS and NOS (Restore and Preserve Mississippi-Atchafalaya River Processes), has a clear nexus to injured resources that can benefit from Wetlands, Coastal, and Nearshore Habitats restoration, and is consistent with the additional considerations.

Project ID	Project Name	Brief Project Description	Initial Screening Results
MP 002.MC.05e	Large Scale Barataria Marsh Creation – Component E	Creation of approximately 12,900 acres of marsh in the Barataria Basin south of the Pen to the Barataria Landbridge to create new wetland habitat and restore degraded marsh.	Carried forward for analysis because it is located in/benefits the Barataria Basin, is included as a restoration approach in the PDARP/PEIS and NOS (Create, Restore and Enhance Coastal Wetlands), has a clear nexus injured resources that can benefit from Wetlands, Coastal, and Nearshore Habitats restoration, and is consistent with the additional considerations
MP 002.MC.04a	Lower Barataria Marsh Creation – Component A	Creation of approximately 7,400 acres of marsh in Jefferson Parish on the east shore of Little Lake and Turtle Bay to create new wetland habitat and restore degraded marsh.	Carried forward for analysis because it is located in/benefits the Barataria Basin, is included as a restoration approach in the PDARP/PEIS and NOS (Create, Restore and Enhance Coastal Wetlands), has a clear nexus injured resources that can benefit from Wetlands, Coastal, and Nearshore Habitats restoration, and is consistent with the additional considerations
MP 002.RC.103	Grand Bayou Ridge Restoration	Restoration of approximately 48,100 feet of historic ridge to an elevation of 5 feet NAVD88 to provide coastal upland habitat, restore natural hydrology, and provide wave and storm surge attenuation along Grand Bayou.	Carried forward for analysis because it is located in/benefits the Barataria Basin, is included as a restoration approach in the PDARP/PEIS and NOS (Create, Restore and Enhance Coastal Wetlands), has a clear nexus to injured resources that can benefit from Wetlands, Coastal, and Nearshore Habitats restoration, and is consistent with the additional considerations
MP 002.RC.102	Bayou Eau Noire Ridge Restoration	Restoration of approximately 34,800 feet of historic ridge to an elevation of 5 feet NAVD88 to provide coastal upland habitat, restore natural hydrology, and provide wave and storm surge attenuation along Bayou Eau Noire.	Carried forward for analysis because it is located in/benefits the Barataria Basin, is included as a restoration approach in the PDARP/PEIS and NOS (Create, Restore and Enhance Coastal Wetlands), has a clear nexus to injured resources that can benefit from Wetlands, Coastal, and Nearshore Habitats restoration, and is consistent with the additional considerations

Project ID	Project Name	Brief Project Description	Initial Screening Results
MP 002.RC.101	Adams Bay Ridge Restoration	Restoration of approximately 31,600 feet of historic ridge to an elevation of 5 feet NAVD88 to provide coastal upland habitat, restore natural hydrology, and provide wave and storm surge attenuation along Adams Bay.	Carried forward for analysis because it is located in/benefits the Barataria Basin, is included as a restoration approach in the PDARP/PEIS and NOS (Create, Restore and Enhance Coastal Wetlands), has a clear nexus to injured resources that can benefit from Wetlands, Coastal, and Nearshore Habitats restoration, and is consistent with the additional considerations
MP 002.RC.100	Red Pass Ridge Restoration	Restoration of approximately 23,000 feet of historic ridge southwest of Venice to provide coastal upland habitat, restore natural hydrology, and provide wave and storm surge attenuation along the banks of Red Pass.	Carried forward for analysis because it is located in/benefits the Barataria Basin, is included as a restoration approach in the PDARP/PEIS and NOS (Create, Restore and Enhance Coastal Wetlands), has a clear nexus to injured resources that can benefit from Wetlands, Coastal, and Nearshore Habitats restoration, and is consistent with the additional considerations
MP 002.RC.02	Spanish Pass Increment of the Barataria Basin Ridge and Marsh Creation	The Spanish Pass Increment of the Barataria Basin Ridge and Marsh Creation project includes the restoration of 120 acres of earthen ridge, and the creation of approximately 1,100 acres of marsh with sediment dredged from the Mississippi River.	Carried forward for analysis because it is located in/benefits the Barataria Basin, is included as a restoration approach in the PDARP/PEIS and NOS (Create, Restore and Enhance Coastal Wetlands), has a clear nexus to injured resources that can benefit from Wetlands, Coastal, and Nearshore Habitats restoration, and is consistent with the additional considerations
MP 002.SP.100	Lake Hermitage Shoreline Protection	Shoreline protection through rock breakwaters designed to an elevation of 3.5 feet NAVD88 along approximately 6,500 feet around the southern shore of Lake Hermitage to preserve shoreline integrity and reduce wetland degradation from wave erosion.	Carried forward for analysis because it is located in/benefits the Barataria Basin, is included as a restoration approach in the PDARP/PEIS and NOS (Create, Restore and Enhance Coastal Wetlands), has a clear nexus to injured resources that can benefit from Wetlands, Coastal, and Nearshore Habitats restoration, and is consistent with the additional considerations

Project ID	Project Name	Brief Project Description	Initial Screening Results
MP 002.SP.102	East Snail Bay Shoreline Protection	Shoreline protection through rock breakwaters designed to an elevation of 3.5 feet NAVD88 along approximately 7,300 feet of the northeastern shore of Snail Bay south of Little Lake to preserve shoreline integrity and reduce wetland degradation from wave erosion.	Carried forward for analysis because it is located in/benefits the Barataria Basin, is included as a restoration approach in the PDARP/PEIS and NOS (Create, Restore and Enhance Coastal Wetlands), has a clear nexus to injured resources that can benefit from Wetlands, Coastal, and Nearshore Habitats restoration, and is consistent with the additional considerations
MP 002.SP.103	West Snail Bay Shoreline Protection	Shoreline protection through rock breakwaters designed to an elevation of 3.5 feet NAVD88 along approximately 16,600 feet of the western shoreline of Snail Bay south of Little Lake to preserve shoreline integrity and reduce wetland degradation from wave erosion.	Carried forward for analysis because it is located in/benefits the Barataria Basin, is included as a restoration approach in the PDARP/PEIS and NOS (Create, Restore and Enhance Coastal Wetlands), has a clear nexus to injured resources that can benefit from Wetlands, Coastal, and Nearshore Habitats restoration, and is consistent with the additional considerations
MP 002.SP.106	Bayou Perot Shoreline Protection	Shoreline protection through rock breakwaters designed to an elevation of 3.5 feet NAVD88 along approximately 5,900 feet of the western shore of Bayou Perot to preserve shoreline integrity and reduce wetland degradation from wave erosion.	Carried forward for analysis because it is located in/benefits the Barataria Basin, is included as a restoration approach in the PDARP/PEIS and NOS (Create, Restore and Enhance Coastal Wetlands), has a clear nexus to injured resources that can benefit from Wetlands, Coastal, and Nearshore Habitats restoration, and is consistent with the additional considerations (Create, Restore and Enhance Coastal Wetlands)

Table 4
Summary of Projects Carried Forward for Further Consideration

Project	Located in or benefits the Barataria Basin?	Consistent with PDARP/PEIS?	Consistent with NOS Restoration Approach?	Consistent with NOS Restoration Technique?	Initial OPA Eligibility	Contributes to Restoration of Ecosystem?
Mid-Barataria Sediment Diversion	Yes	Yes	Restore and Preserve Mississippi-Atchafalaya River Processes	Large-scale controlled sediment diversion	Yes	Yes
Ama Sediment Diversion	Yes	Yes	Restore and Preserve Mississippi-Atchafalaya River Processes	Large-scale controlled sediment diversion	Yes	Yes
Large Scale Barataria Marsh Creation – Component E	Yes	Yes	Create, Restore and Enhance Coastal Wetlands	Marsh creation	Yes	Yes
Lower Barataria Marsh Creation – Component A	Yes	Yes	Create, Restore and Enhance Coastal Wetlands	Marsh creation	Yes	Yes
Grand Bayou Ridge Restoration	Yes	Yes	Create, Restore and Enhance Coastal Wetlands	Ridge restoration	Yes	Yes
Bayou Eau Noire Ridge Restoration	Yes	Yes	Create, Restore and Enhance Coastal Wetlands	Ridge restoration	Yes	Yes
Adams Bay Ridge Restoration	Yes	Yes	Create, Restore and Enhance Coastal Wetlands	Ridge restoration	Yes	Yes
Red Pass Ridge Restoration	Yes	Yes	Create, Restore and Enhance Coastal Wetlands	Ridge restoration	Yes	Yes
Spanish Pass Increment of the Barataria Basin Ridge and Marsh Creation	Yes	Yes	Create, Restore and Enhance Coastal Wetlands	Ridge Restoration and Marsh Creation	Yes	Yes
Lake Hermitage Shoreline Protection	Yes	Yes	Create, Restore and Enhance Coastal Wetlands	Breakwater construction	Yes	Yes
East Snail Bay Shoreline Protection	Yes	Yes	Create, Restore and Enhance Coastal Wetlands	Breakwater construction	Yes	Yes
West Snail Bay Shoreline Protection	Yes	Yes	Create, Restore and Enhance Coastal Wetlands	Breakwater construction	Yes	Yes
Bayou Perot Shoreline Protection	Yes	Yes	Create, Restore and Enhance Coastal Wetlands	Breakwater construction	Yes	Yes

In summary, of the 37 potential projects considered under this Barataria Basin SRP/EA, 19 projects were removed from consideration because they did not benefit wetlands, coastal, and nearshore habitats in the Barataria Basin, and five projects were screened out because the project does not directly contribute to restoration of ecosystem-level injuries, such as research/academic project proposals. Thirteen projects were carried forward as example projects that would pertain to the different strategic restoration alternatives:

- Two large-scale sediment diversion projects,
- Two large-scale marsh creation projects, four ridge restoration projects, and one combined marsh creation/ridge restoration project, and
- Four breakwater construction projects (also referred to as shoreline protection projects).

2.3.3.1 Large-Scale Sediment Diversions

The PDARP/PEIS evaluated large-scale Mississippi River sediment diversions as a tool for restoring the complex, ecosystem-level impacts from the DWH oil spill (See Section 5.5.2 and Appendix 5.D.1.2 in the PDARP/PEIS). Large-scale sediment diversions are designed for significant marsh creation through the transportation of large quantities of mineral sediments via high discharge volumes from the Mississippi River. Large-scale sediment diversions focus on maximizing sediment capture and habitat creation through the operation of gated structures that control flows through the diversion. As noted in the PDARP/PEIS, these types of controlled large-scale sediment diversions are distinct from the creation of small gaps or crevasses in delta distributary channel levees to transport river sediment and fresh water into interdistributary basins and initiate subdelta formation, without the environmental controls possible through gated structures.

Large-scale sediment diversions differ from the existing freshwater diversions (e.g., Davis Pond) because they are specifically designed to maximize the delivery of riverine sediment into existing marshes and shallow open water areas to build new marshes, help enhance degraded marshes, and provide necessary sediment, freshwater, and nutrients to maintain both existing and created marshes. Unlike the existing freshwater diversions, large-scale sediment diversions would be constructed at point bar locations along the river with high potential for natural sediment accumulation. Large-scale sediment diversion intake structures would also be built to a depth sufficient to capture a higher concentration of sediment and larger grain sizes (i.e., sand and silt) transported in the lower portion of the water column. Mineral sediment delivered by large-scale sediment diversions during the river's annual flood would provide a stable substrate for the development of healthy new marshes and also enhance the stability of existing marshes.

In addition to reintroducing sediment into the Barataria Basin to build land, large-scale sediment diversions restore a range of other deltaic processes that have been cut off from this area since the river was contained within levees. For example, sediment diversions would also introduce nutrients and freshwater into the Barataria Basin, which would help to enhance primary productivity in the Basin. Furthermore, as changes in sea level and land loss increase the salinity of the Barataria Basin, the introduction of freshwater from large-scale sediment diversions would maintain the estuarine gradients in salinity that help to enhance the biodiversity in the Basin.

This high biodiversity would in turn help to sustain the broader food web throughout the Gulf of Mexico ecosystem.

In contrast to large-scale sediment diversions, freshwater diversions do not re-establish the natural sediment deposition process, as they are designed to move freshwater from the highest parts of the water column, not sediment. Freshwater diversions mostly transport finer-grained sediment particles and do not transport the substantial amounts of coarser-grained sediments associated with larger crevasses or delta-switching events. While the movement of freshwater and nutrients into an area can help nourish and sustain existing marshes and wetlands, this type of diversion does not maximize the creation of new wetlands. The introduction and deposition of sediment into a sediment starved system is critical for the long-term sustainability and overall survivability of Louisiana's wetlands, which is why Louisiana has identified that large-scale sediment diversions are critical to restoring coastal Louisiana. Sediment deposition into the system will help marshes keep pace with sea level rise, subsidence, storm surge, and other factors. In most cases, nutrient and freshwater-driven increases in marsh accretion are not enough to overcome these factors.

Large-scale sediment diversions also differ from small-scale sediment diversions which are typically used to achieve site-specific benefits, rather than the regional benefits associated with large-scale sediment diversions (PDARP/PEIS, Ch. 5). Smaller-scale sediment diversions are designed to restore the natural deposits and landforms associated with deltaic distributary channels, rather than restoring larger-scale riverine processes. However, in some instances, it may be possible for multiple small-scale diversions operating together to provide basin wide, or regional, benefits similar to those of large-scale sediment diversions (PDARP/PEIS, Ch. 5.D). The 2012 CMP explored the marsh creation and ecosystem service effects of using multiple small-scale sediment diversions from the Mississippi river to restore Louisiana's coast. The results of the multiple small-scale sediment diversion project modeled as part of the analysis for the 2012 CMP showed that the differences between multiple small-scale diversions and large sediment diversions in the level of ecosystem services maintained were minimal, and in some instances, the smaller diversions decreased the level of ecosystem services, e.g. oysters, as much or more than large sediment diversions (2012 CMP, Ch. 4). However, the construction of large-scale sediment diversions as a restoration technique in lieu of multiple small diversions were modeled to provide a significant benefit of building an additional approximately 134,000 – 275,000 acres of marsh/coastal wetlands (2012 CMP, Ch. 4). Further, the aggregate adverse environmental impacts of multiple small-scale diversions are comparable to that of larger-scale sediment diversions. As a result, Louisiana discontinued further consideration of small-scale diversions in the 2012 CMP, and this decision was carried forward in the 2017 CMP.

Similar to freshwater diversions, multiple small-scale diversions would not maximize marsh creation/protection in the Barataria Basin. Further, multiple small-scale diversions would provide only limited additional ecosystem level benefits, and would not minimize potential adverse impacts, compared to large-scale sediment diversions. For these reasons, and consistent with the Final PDARP/PEIS, the LA TIG has eliminated the implementation of one or more small-scale diversions from further consideration of strategic alternatives for restoring the ecosystem injury in Barataria Basin. This decision is also consistent with Louisiana's decision to specifically reject small-scale diversions as a restoration technique in the 2012 and 2017 CMPs.

Despite the high cost of construction, large-scale sediment diversions are anticipated to be more cost effective long-term than other methods of marsh creation. Other projects are also constrained by location of the borrow areas because the longer the distance to the borrow source, the higher the cost to transport dredged material to marsh creation sites (Figure 3). Marsh creation projects primarily use mineral sediments, dredged from borrow areas in the Mississippi River or offshore, to build land, which greatly increases costs. In the case of a large-scale sediment diversion, there would be no cost to transport sediment besides the cost of constructing the diversion structure and the ongoing operations and maintenance costs associated with the diversion.

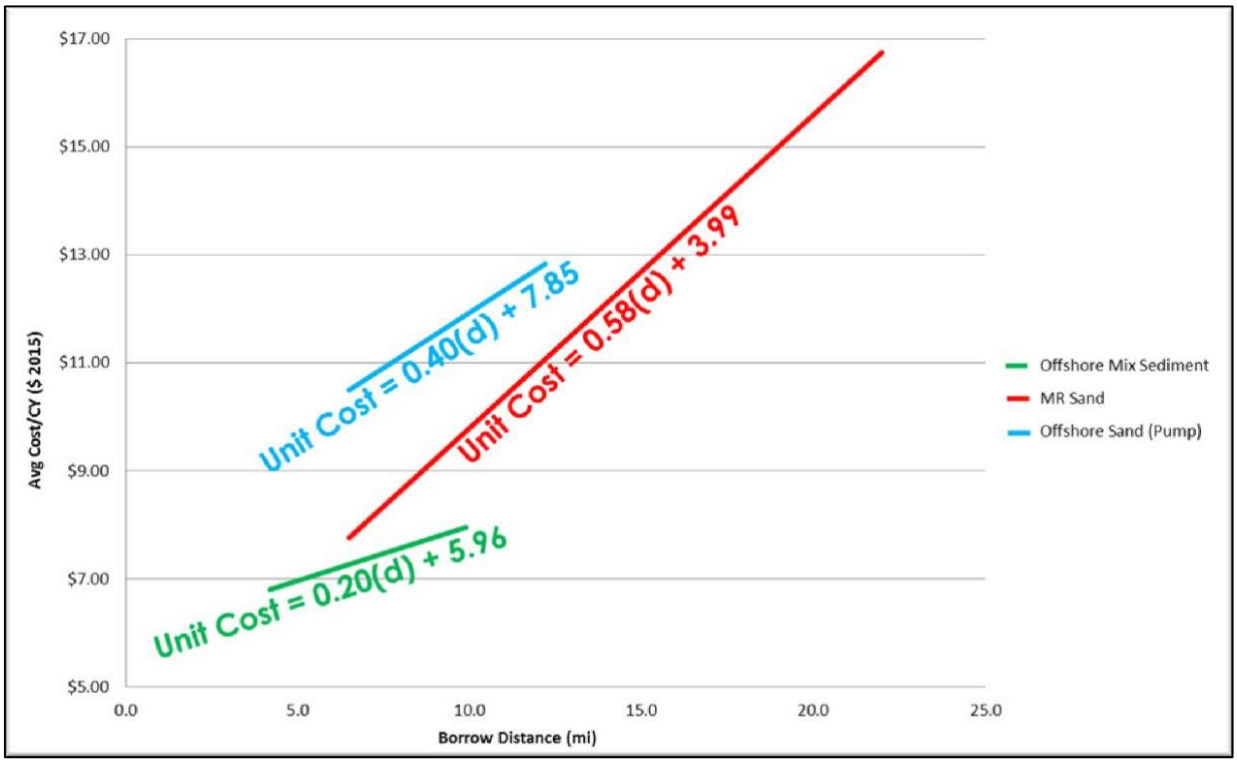

Figure 3. Cost versus Distance Pumped by Sediment Source (CPRA, 2017 Appendix A)

The CMP has documented the relative benefits and importance of large-scale sediment diversions as compared to other land-building alternatives. The 2012 CMP included a comparison of three restoration project types to a future without action (FWOA) scenario: large-scale sediment diversions, multiple small diversions, and a no diversions/mechanical land building only alternative (see p. 106 in 2012 CMP). This comparison demonstrated that large-scale sediment diversions are critical to maximizing/ maintaining land-building. In the "no diversions" alternative, the total land expected to be created or maintained was half of the land expected to be gained by the large-scale sediment diversion. Modeling indicated that large-scale sediment diversion could both build marsh and reduce landscape-scale elevation deficit slowing further wetland losses due to climate predicted changes (e.g. subsidence, sea level rise) (Wang et al., 2014a). Similarly, multiple small diversions were expected to create 135,000 acres less land than a large-scale sediment diversion is predicted to create.

All CMP large-scale sediment diversion projects have located the diversion intake placement on top of a sand bar, which significantly (and favorably) impacts the sand capture efficiency of the diversion. Large-scale sediment diversions on the inside of a meander take advantage of the secondary motion and increased bed shear stress, leading to significant increase in the entrainment of sand into suspension and getting captured by the diversion (Meselhe and Sadid, 2015).

2.3.3.1.1 Large-scale Sediment Diversion Project Examples

In the sections below, the Trustees provide a short description of example large-scale sediment diversion projects that the Trustees may choose to move forward through the planning process, including developing Phase II restoration plans/tiered NEPA documents that would fully analyze environmental consequences of project implementation alternatives. Each section below includes a brief description of the example large-scale sediment diversion project.

2.3.3.1.2 Large-scale Sediment Diversion Project Example 1: Mid-Barataria Sediment Diversion

The MBSD is located near Ironton in Plaquemines Parish, Louisiana (Figure 4). The 2017 CMP relied on modeling to determine the volume of land loss or gain. Based on the model outputs, the MBSD is expected to build or maintain 8,000 acres of land in the near-term (Year 20) and 29,700 acres of land in the long-term (Year 50). The Mid-Barataria Sediment Diversion intake placement is proposed to be located on top of a sand bar at river mile (RM) 60.7, which past studies (e.g., MDMG, CPRA/NGO, MRHDMS) have shown to be the most efficient location for this diversion based on the expected sediment concentration in the water column at this reach of the river. Basing future plans on this in-depth investigation into location will increase the likelihood of success.

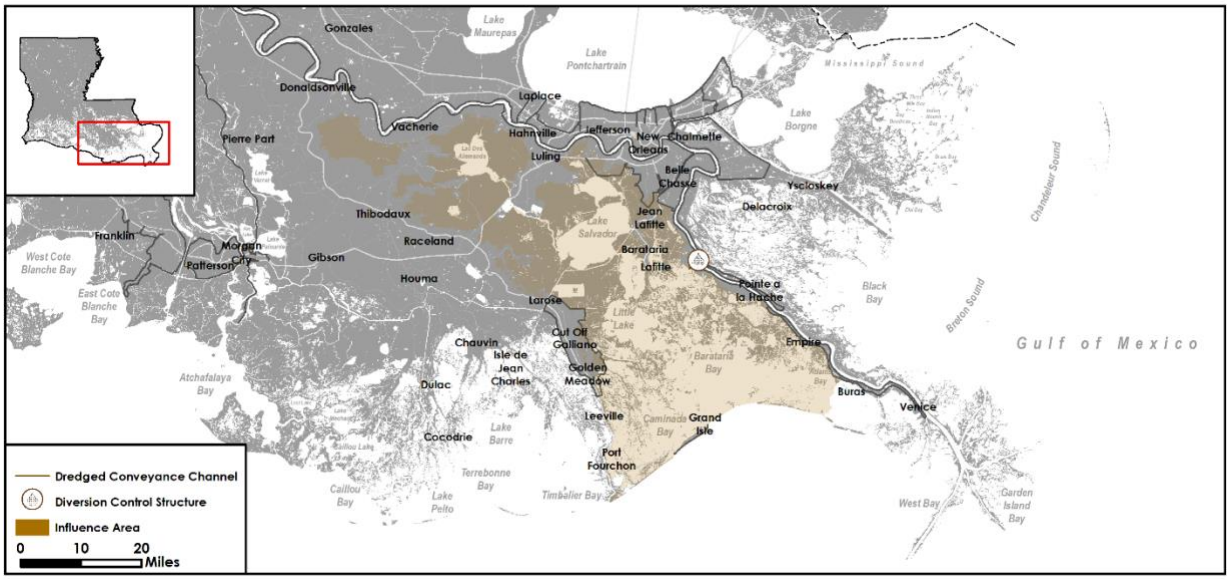

Figure 4. Mid-Barataria Sediment Diversion

This project is located in the Barataria Basin, is consistent with the PDARP/PEIS restoration type (Wetlands, Coastal, and Nearshore Habitats) and restoration approach (Restore and Preserve Mississippi-Atchafalaya River Processes) that are the focus of this SRP/EA, has a clear nexus to

the injury, and can be reasonably expected to directly restore for ecosystem level injuries. This project is included in the 2017 CMP.

The 2017 CMP project cost estimate includes $39,400,000 for planning/engineering and design (already funded through GEBF), $821,400,000 for construction, and $138,000,000 for operation and maintenance (O+M), for a total cost of $998,800,000, of which $959,400,000 is not yet funded. Cost estimates will be further refined during design.

2.3.3.1.3 Large-scale Sediment Diversion Project Example 2: Ama Sediment Diversion

The Ama Sediment Diversion is located in St. Charles Parish, Louisiana, and is designed to discharge into Upper Barataria Basin, near Ama, Louisiana, to provide sediment for emergent marsh creation and freshwater to maintain existing wetlands (Figure 5). The Ama Sediment Diversion is located on the most efficient sand bar to benefit the Upper Barataria Basin, which increases its likelihood of success.

As part of the 2017 CMP, CPRA modelled the likely effects of the Ama Sediment Diversion. In the 2017 CMP, it is modeled at a 50,000 cfs capacity[6]. In the near-term (Year 20), it is expected that the project area would experience a loss of approximately 3,700 acres of land, but the project would be expected to build or maintain 76,600 acres over the long-term (Year 50).

The CMP models project land loss in the first 20 years due to assumed drought conditions reflected in the historical rainfall record. The furthest portions of fresh marsh are lost during low rainfall years, regardless of the operation of the diversion. Loss would occur whenever the drought year occurred within the project's modeled life, and for this historical record used for the model projections, this occurred in the first 20 years.

This project is located in Upper Barataria Basin, is consistent with the PDARP/PEIS restoration type (Wetlands, Coastal, and Nearshore Habitats) and restoration approach (Restore and Preserve Mississippi-Atchafalaya River Processes) that are the focus of this SRP/EA, has a nexus to injured resources (although its location was largely protected from the oil spill), and can be reasonably expected to directly restore for ecosystem level injuries. In addition, the project is included in the 2017 CMP.

[6] (i.e., modeled at 50,0000 cfs when Mississippi River flow equals 1,000,000 cfs; open with a variable flow rate calculated using a linear function from zero to 50,000 cfs for river flow between 200,000 cfs and 1,000,000 cfs, diverts exactly 50,000 cfs when Mississippi River flow is 1,000,000 cfs; and open with variable flow rate [larger than 50,000 cfs, estimated using linear extrapolation] for river flow above 1,000,000 cfs). No operation occurs when the Mississippi River is below 200,000 cfs.

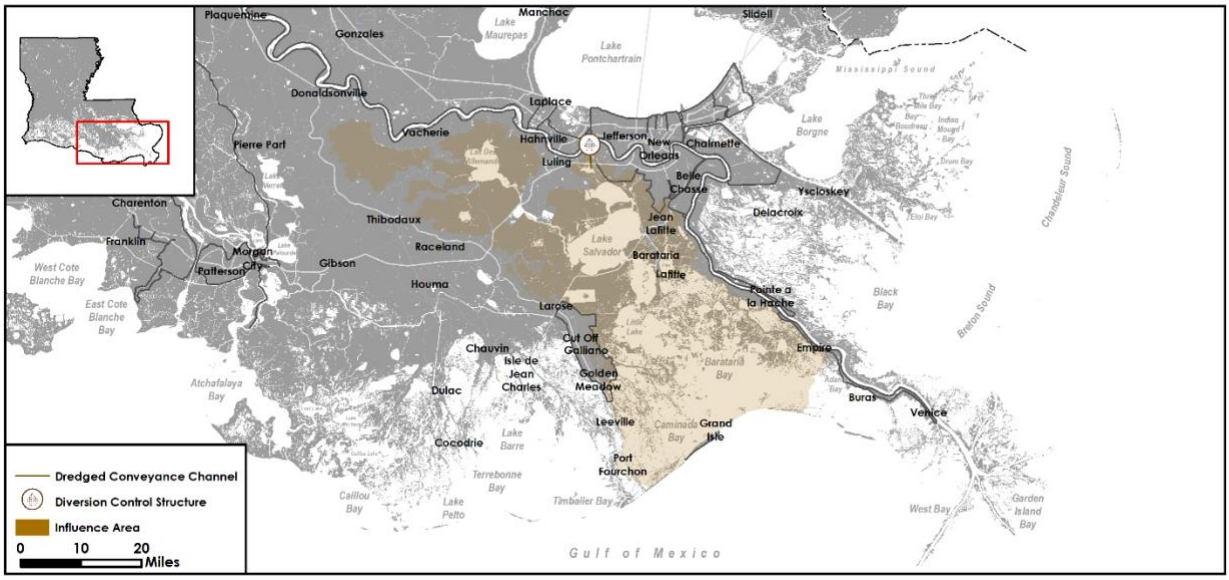

Figure 5. Ama Sediment Diversion

The 2017 CMP project cost estimate includes $58,400,000 for planning/engineering and design, $730,400,000 for construction, and $93,500,000 for O+M, for a total cost of $882,300,000 for the Ama Sediment Diversion.

This project is anticipated to build or maintain 76,600 acres of wetland habitat in the long-term (Year 50), with the objective of offsetting injuries caused by the DWH oil spill. While it is anticipated that this project would provide some benefits to the resources injured by the DWH oil spill, the location of restoration would primarily occur in Upper Barataria Basin, which was largely protected from the oil spill due to its much farther inland location.

2.3.3.2 Marsh Creation

Marsh creation projects in the Barataria Basin will create or enhance coastal wetlands through the targeted placement of dredged materials at appropriate elevations to create a functioning and sustainable marsh complex. Marsh creation projects involve the movement of sediment from off-shore or nearshore bodies of water (i.e., bayous, lakes, canals), or from point bars in the Mississippi River, to specified locations within the basin, using mechanical dredging to obtain the sediment and then transporting it via pipeline. Dredged sediment is suspended in water as slurry for pipeline transport, but projects are not intended to convey freshwater or nutrients to the containment site. Dredged material is used to build discrete marsh cells within areas of degraded wetlands. The material is placed to a specific elevation so that desired wetland plants will colonize and grow to form new marsh. These projects begin to provide ecological benefits shortly after construction, although recovery of belowground metrics such as soil organic content, root biomass, and biogeochemistry may occur over a period of 15-20 years or more (Craft et al., 1999; Zedler and Callaway, 1999; Moreno-Mateos et al., 2012; Zedler et al., 2014).

2.3.3.3 Marsh Creation Project Examples

In the sections below, the Trustees provide a short description of example marsh creation projects that the Trustees may choose to move forward through the planning process, including

developing Phase II restoration plans/tiered NEPA documents that would fully analyze environmental consequences of project implementation alternatives. Each section below includes a brief description of the example marsh projects.

2.3.3.3.1 Marsh Creation Project Example 1: Large-Scale Marsh Creation – Component E

The Large-Scale Barataria Marsh Creation – Component E project would create approximately 12,900 acres of marsh at the time of construction in Plaquemines and Jefferson parishes, Louisiana, in the Barataria Basin, south of The Pen to the Barataria Landbridge, to create new wetland habitat and restore degraded marsh (Figure 6). Although this project has several increments, only the highlighted project increment was recommended in the 2017 CMP (i.e., Component E, see Figure 2-3).

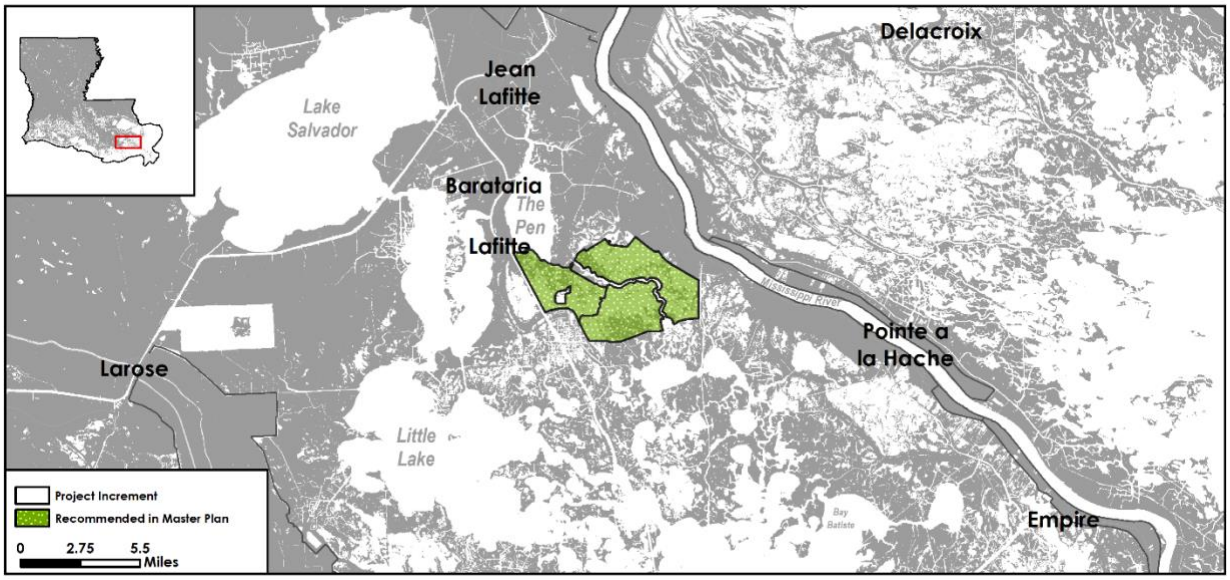

Figure 6. Large-Scale Barataria Marsh Creation – Component E

This project is located in the Barataria Basin, is consistent with the PDARP/PEIS restoration type (Wetlands, Coastal, and Nearshore Habitats) and restoration approach (Create, Restore, and Enhance Coastal Wetlands), has a clear nexus to the injury that occurred in Louisiana, and can be reasonably expected to directly restore for ecosystem level injuries in the Barataria Basin. This project is included in the 2017 CMP.

The 2017 CMP project cost estimate includes $48,700,000 for planning/engineering and design, $608,600,000 for Construction, and $17,200,000 for O+M for a total cost of $674,500,000. Marsh creation projects are important components of the suite of restoration projects that the State of Louisiana believes is needed to restore the coast, as they build land immediately upon construction. This project would result in positive land area change for the majority of the project life under the high scenario compared to the future without project.

2.3.3.3.2 Marsh Creation Project Example 2: Lower Barataria Marsh Creation – Component A

The Lower Barataria Marsh Creation project would create approximately 7,400 acres of marsh at the time of construction in Jefferson Parish, Louisiana, on the east shore of Little Lake and Turtle

Bay to create new wetland habitat and restore degraded marsh (Figure 7). Although this project has several increments, only the highlighted project increment was recommended in the 2017 CMP (i.e., Component A).

This project is located in the Barataria Basin, is consistent with the PDARP/PEIS restoration type (Wetlands, Coastal, and Nearshore Habitats) and restoration approach (Create, Restore, and Enhance Coastal Wetlands), has a clear nexus to the injury that occurred in Louisiana, and can be reasonably expected to directly restore for ecosystem level injuries in the Barataria Basin. This project is included in the 2017 CMP.

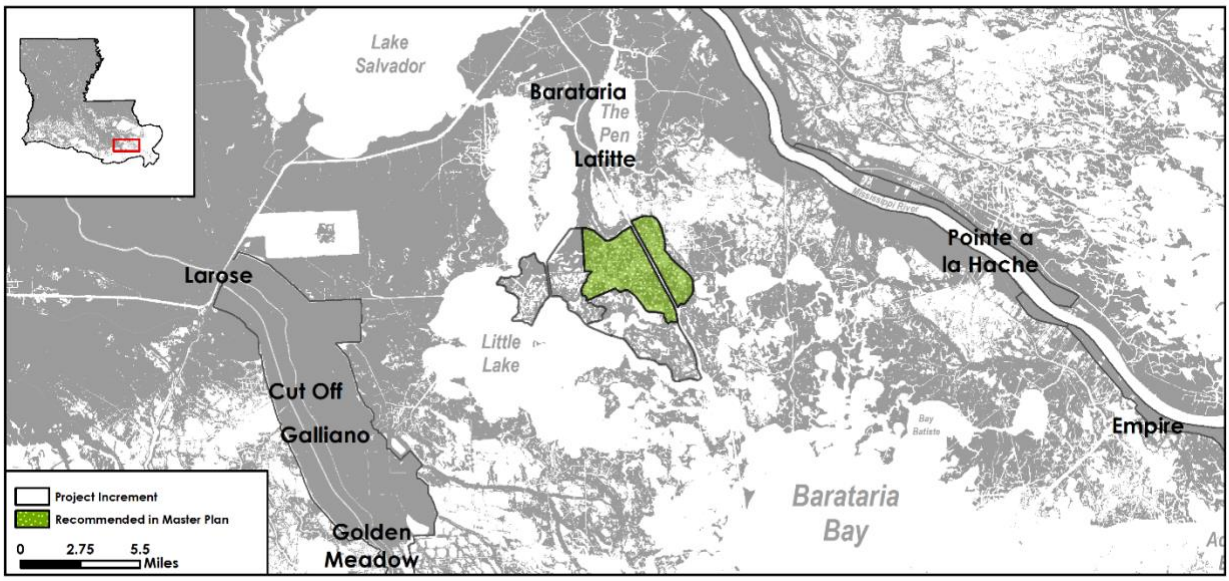

Figure 7. Lower Barataria Marsh Creation – Component A

The 2017 CMP project cost estimate includes $52,100,000 for planning/engineering and design, $651,200,000 for construction, and $6,300,000 for O+M for a total cost of $709,600,000.

This project was a candidate project considered under the 2012 CMP and was reconsidered for the 2017 CMP because it is located on a critical landform, and has therefore undergone substantial analysis as discussed in Section 1. This project would result in positive land area change for the majority of the project life under the high scenario compared to the future without project, although it does succumb to sea level rise, subsidence and other environmental factors in the last few years.

2.3.3.4 Ridge Restoration

Ridge restoration is an example of "Create or enhance coastal wetlands through placement of dredged material" technique identified in the PDARP/PEIS. Ridge restoration projects re-establish historical ridge features. The wetlands, swamps, barrier islands, and ridges of coastal Louisiana are a part of the unique, complex system that formed in response to sediment accumulation from delta switching over the past several thousand years (Conner and Day, 1987; Day et al., 2007; Morgan, 1967; Peyronnin, 2013). In active deltas, sedimentation typically exceeds erosion; in abandoned deltas, the reverse is true (Conner and Day, 1987). The ridges

typically form along the channels as natural levees within the active delta system from the deposition of coarse sediment. The Barataria Basin is an example of an interdistributary-wetland system located between the natural levees of the active Mississippi River and the abandoned Lafourche distributary with the lower elevations between the levees (Conner and Day, 1987).

The ridges become prominent features in an otherwise flat landscape. Historically, the ridges supported wetland and woody vegetation and are generally flanked by marsh. Being the high land within the delta, ridges are corridors for many terrestrial wildlife species; they were also the location of human settlement (Conner and Day, 1987). Generally, erosion and deterioration of the marshes and ridges in the Barataria Basin are a result of increased relative sea level rise, diminished sediment supply, repeated storm events, and construction of canals and navigation channels (Boesch et al., 1994). The marshes in the Barataria Basin are near sea level and are frequently inundated with several feet of water during hurricanes and tropical storms. Only remnants of ridges remain, as ridges and their flanking marshes have been lost due to conversion to open water. Re-establishing these historical features could prevent future injury to marsh and other habitats.

Ridge Restoration projects, as proposed in the 2017 CMP, are intended to reestablish historical ridges through sediment placement and vegetative plantings to provide additional storm surge attenuation and restore forested maritime habitat. These projects are a small part, in project size and cost, of the 2017 CMP. In general, the Barataria ridge restoration projects do not build significant amounts of new coastal habitat, as they are narrow, linear features constructed on existing historic ridge locations. The surge and wave modeling by Corbell et al. (2013) indicated that narrow restored landscapes, e.g. barrier islands or ridges, provided some wave attenuation but minimal surge protection. They found that larger-scale restoration projects, e.g. large-scale sediment diversions, could result in vegetation coverage and land accretion that had benefits in dampening waves and storm surge resulting in risk reduction to property. This type of habitat is regionally scarce, due to the erosion of historical ridges, so implementing this alternative would benefit the plants and animals in the Barataria Basin ecosystem that would utilize this habitat type.

2.3.3.5 Ridge Restoration Project Examples

In the sections below, the Trustees provide a short description of example ridge restoration projects that the Trustees may choose to move forward through the planning process, including developing Phase II restoration plans/tiered NEPA documents that would fully analyze environmental consequences of project implementation alternatives. Each section below includes a brief description of the example ridge restoration projects.

2.3.3.5.1 Ridge Restoration Project Example 1: Grand Bayou Ridge Restoration

The Grand Bayou Ridge Restoration project includes the restoration of approximately 48,100 feet of historic ridge to an elevation of 5 feet NAVD88 to provide coastal upland habitat, restore natural hydrology, and provide wave and storm surge attenuation along Grand Bayou, located in Plaquemines Parish, Louisiana (Figure 8). This would build or maintain approximately 330 acres of ridge habitat in the near-term (Year 20) and 250 acres in the long-term (Year 50).

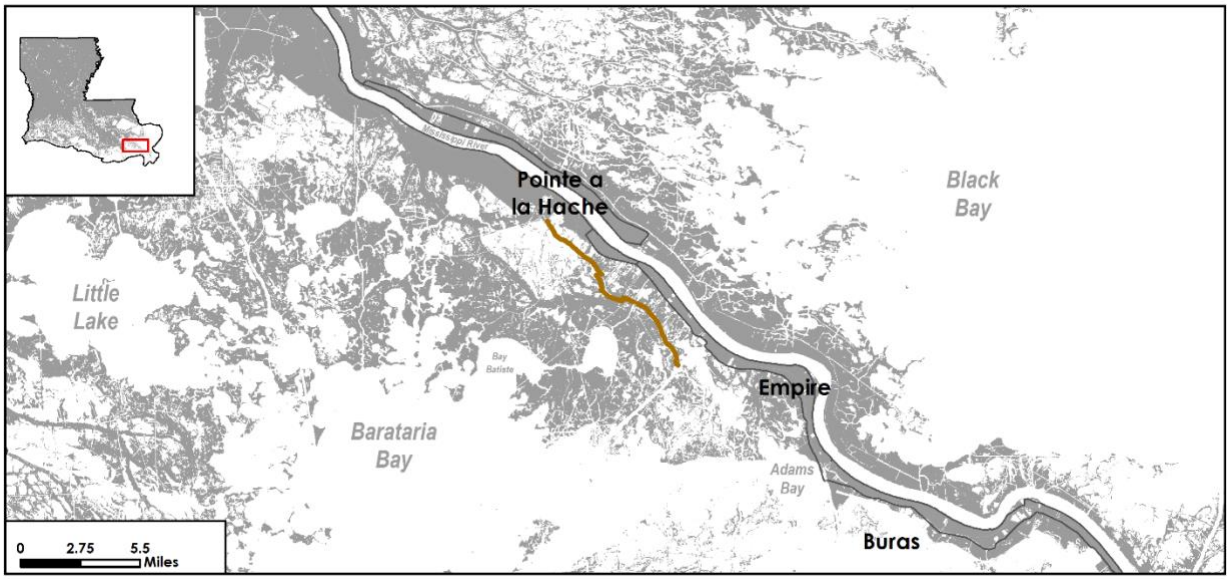

Figure 8. Grand Bayou Ridge Restoration

This project is located in the Barataria Basin, is consistent with the PDARP/PEIS restoration type (Wetlands, Coastal, and Nearshore Habitats) and restoration approach (Create, Restore, and Enhance Coastal Wetlands), has a clear nexus to the injury that occurred in Louisiana, and can be reasonably expected to directly restore for ecosystem level injuries in the Barataria Basin. This project is included in the 2017 CMP.

The 2017 CMP project cost estimate includes $700,000 for planning/engineering and design, 7,300,000 for construction, and $2,300,000 for O+M, for a total cost of $10,300,000.

2.3.3.5.2 Ridge Restoration Project Example 2: Bayou Eau Noire Ridge Restoration

The Bayou Eau Noire Ridge Restoration project includes the restoration of approximately 34,800 feet of historic ridge to an elevation of 5 feet NAVD88 to provide coastal upland habitat, restore natural hydrology, and provide wave and storm surge attenuation along Bayou Eau Noire, located in Plaquemines Parish, Louisiana (Figure 9). This would build or maintain approximately 15 acres of wetland and ridge habitat in the near-term (Year 20) and 450 acres in the long-term (Year 50).

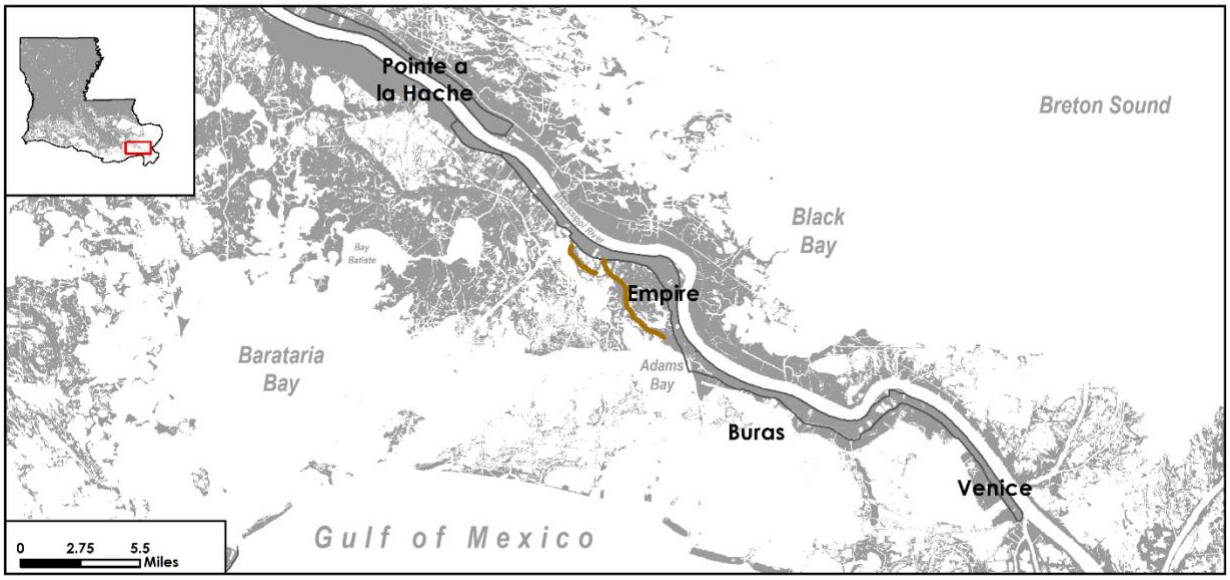

Figure 9. Bayou Eau Noire Ridge Restoration

This project is located in the Barataria Basin, is consistent with the PDARP/PEIS restoration type (Wetlands, Coastal, and Nearshore Habitats) and restoration approach (Create, Restore, and Enhance Coastal Wetlands), has a clear nexus to the injury that occurred in Louisiana, and can be reasonably expected to directly restore for ecosystem level injuries in the Barataria Basin. This project is included in the 2017 CMP.

The project cost estimate includes $700,000 for planning/engineering and design, $7,000,000 for construction, and $2,100,000 for O+M, for a total cost of $9,800,000.

2.3.3.5.3 Ridge Restoration Project Example 3: Adams Bay Ridge Restoration

The Adams Bay Ridge Restoration project includes the restoration of approximately 31,600 feet of historic ridge to an elevation of 5 feet NAVD88 to provide coastal upland habitat, restore natural hydrology, and provide wave and storm surge attenuation along Adams Bay, located in Plaquemines Parish, Louisiana (Figure 10). This would build or maintain approximately 340 acres of ridge habitat in the near-term (Year 20) and 350 acres in the long-term (Year 50).

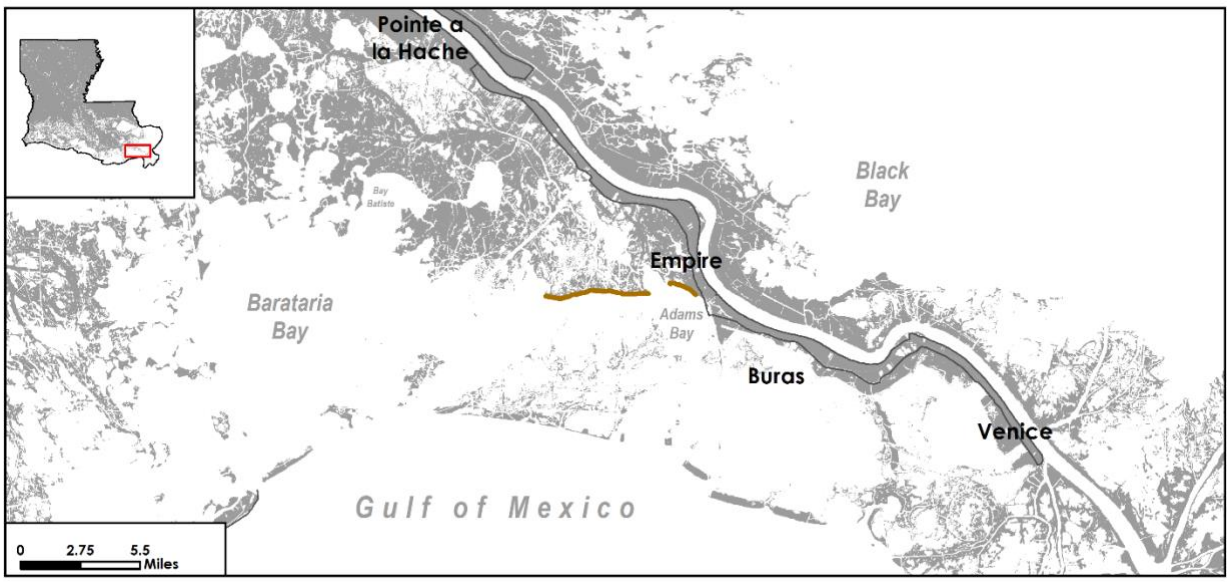

Figure 10. Adams Bay Ridge Restoration

This project is located in the Barataria Basin, is consistent with the PDARP/PEIS restoration type (Wetlands, Coastal, and Nearshore Habitats) and restoration approach (Create, Restore, and Enhance Coastal Wetlands), has a clear nexus to the injury that occurred in Louisiana, and can be reasonably expected to directly restore for ecosystem level injuries in the Barataria Basin. This project is included in the 2017 CMP.

The project cost estimate includes $500,000 for planning/engineering and design, $5,100,000 for construction, $1,600,000 for O+M for a total cost of $7,200,000.

2.3.3.5.4 Ridge Restoration Project Example 4: Red Pass Ridge Restoration

The Red Pass Ridge Restoration project includes the restoration of approximately 23,000 feet of historic ridge to an elevation of 5 feet NAVD88 to provide coastal upland habitat, restore natural hydrology, and provide wave and storm surge attenuation along the banks of Red Pass, located in Plaquemines Parish, Louisiana (Figure 11). This would build or maintain approximately 300 acres of ridge habitat in the near-term (Year 20) and 400 acres in the long-term (Year 50).

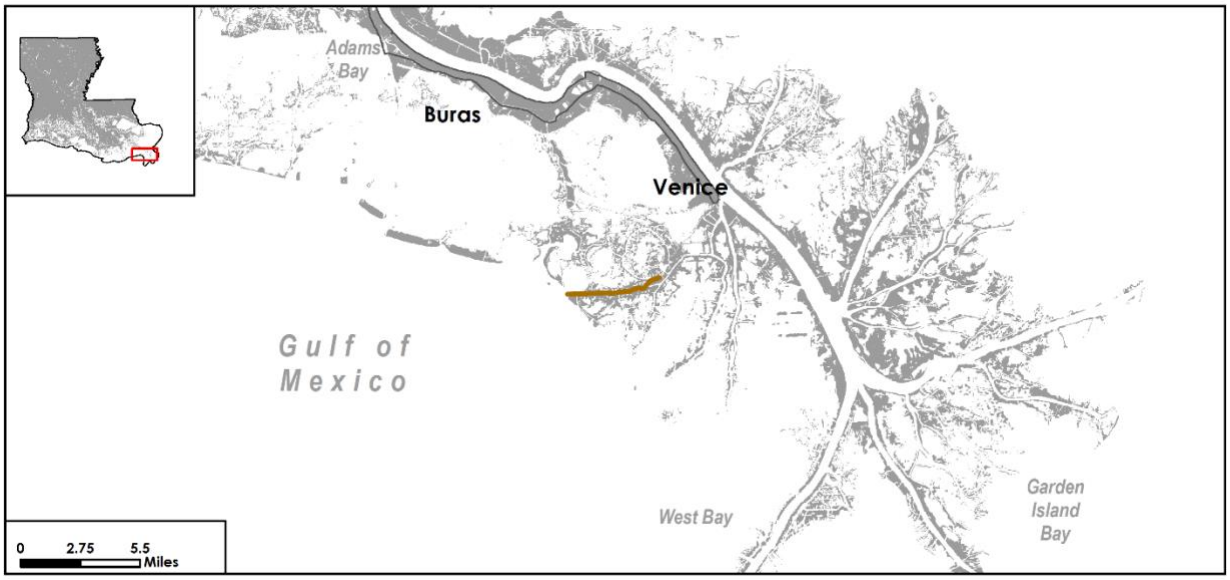

Figure 11. Red Pass Ridge Restoration

This project is located in the Barataria Basin, is consistent with the PDARP/PEIS restoration type (Wetlands, Coastal, and Nearshore Habitats) and restoration approach (Create, Restore, and Enhance Coastal Wetlands), has a clear nexus to the injury that occurred in Louisiana, and can be reasonably expected to directly restore for ecosystem level injuries in the Barataria Basin. This project is included in the 2017 CMP.

The 2017 CMP project cost estimate includes $200,000 for planning/engineering and design, $2,600,000 for construction, and $600,000 for O+M for a total cost of $3,400,000. This would result in the loss of approximately 300 acres of wetlands in the near-term (Year 20) and would build or maintain approximately 400 acres in the long-term (Year 50).

2.3.3.5.5 Combined Ridge Restoration and Marsh Creation Project: Spanish Pass Increment of the Barataria Basin Ridge and Marsh Creation

The Spanish Pass Increment of the Barataria Basin Ridge and Marsh Creation project includes the restoration of 120 acres of earthen ridge, and the creation of approximately 1,100 acres of marsh with sediment dredged from the Mississippi River (Figure 12). The total estimated cost of this project as conceptualized in the Louisiana TIG Phase I plan is $124,500,000. The anticipated engineering and design cost is $4,500,000.

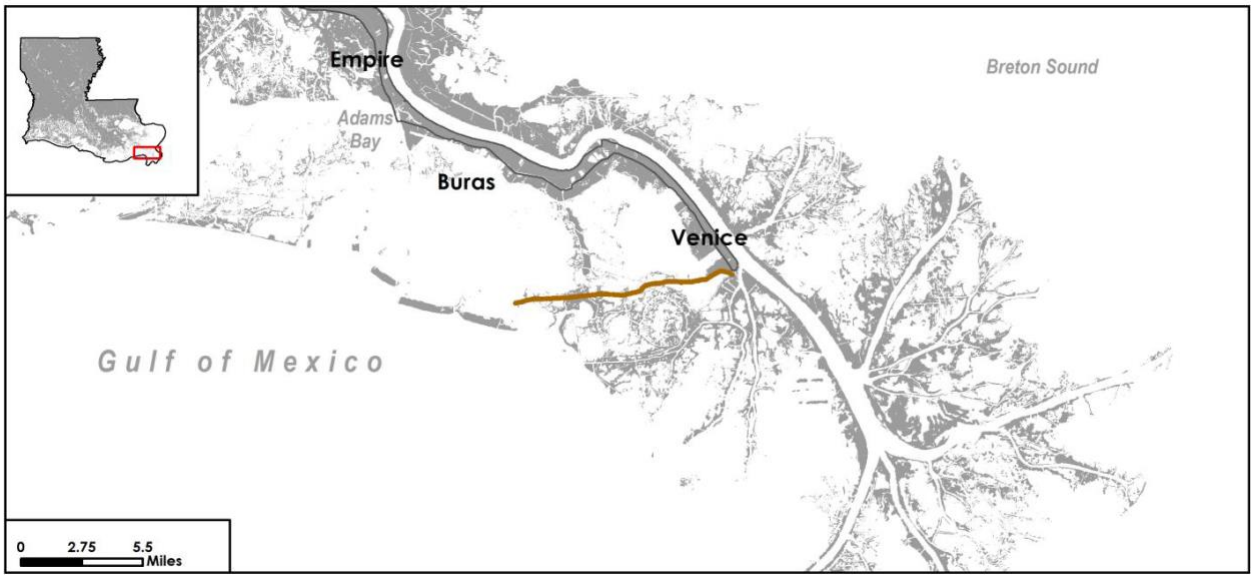

Figure 12. Spanish Pass Increment of the Barataria Basin Ridge and Marsh Creation

This project is located in the Barataria Basin, is consistent with the PDARP/PEIS restoration type (Wetlands, Coastal, and Nearshore Habitats) and restoration approach (Create, Restore, and Enhance Coastal Wetlands), has a clear nexus to the injury that occurred in Louisiana, and can be reasonably expected to directly restore for ecosystem level injuries in the Barataria Basin. This project is a modified version of the Spanish Pass project included in the 2017 CMP, and has been previously selected for advancement by the LA TIG in the first Restoration Plan.

2.3.3.6 Shoreline Protection

Shoreline protection projects are an example of the "construct breakwaters" restoration technique described in the PDARP/PEIS. In the PDARP/PEIS, this technique is described as follows: "This technique would protect coastal wetland habitat through the construction of offshore and/or nearshore breakwaters parallel to the shoreline for the purpose of reducing shoreline erosion. Offshore breakwaters are typically freestanding structures positioned adjacent to the shoreline beyond low-tide contours. They reduce wave energies and currents acting on shorelines, induce sediment deposition, and provide shelter for wetland plants and shoreline habitats (Chasten et al., 1993; Hardaway et al., 2002; Williams and Wang, 2003). These breakwaters counter the extensive shoreline erosion and loss experienced in coastal areas along the Gulf of Mexico. Nearshore breakwaters are typically freestanding structures positioned along the foreshore at intertidal contours to buffer the impact of wave energy. For example, the seaward edge of a wetland shoreline can sometimes be protected from scouring by waves and currents using a riprap revetment at the toe of the wetland" (PDARP/PEIS, Section 5.D.1.1).

2.3.3.7 Shoreline Protection Project Examples

In the sections below, the Trustees provide a short description of example shoreline protection projects using the breakwater construction technique that the Trustees may choose to move forward through the planning process, including developing Phase II restoration plans/tiered NEPA documents that would fully analyze environmental consequences of project

implementation alternatives. Each section below includes a brief description of the example shoreline protection projects.

2.3.3.7.1 Shoreline Protection Example 1: Lake Hermitage Shoreline Protection

The Lake Hermitage Shoreline Protection project involves the placement of rock breakwaters designed to an elevation of 3.5 feet NAVD88 along approximately 6,500 feet around the southern shore of Lake Hermitage to preserve shoreline integrity and reduce wetland degradation from wave erosion (Figure 13). This would build or maintain approximately 250 acres of wetland habitat in the near-term (Year 20) and 100 acres in the long-term (Year 50).

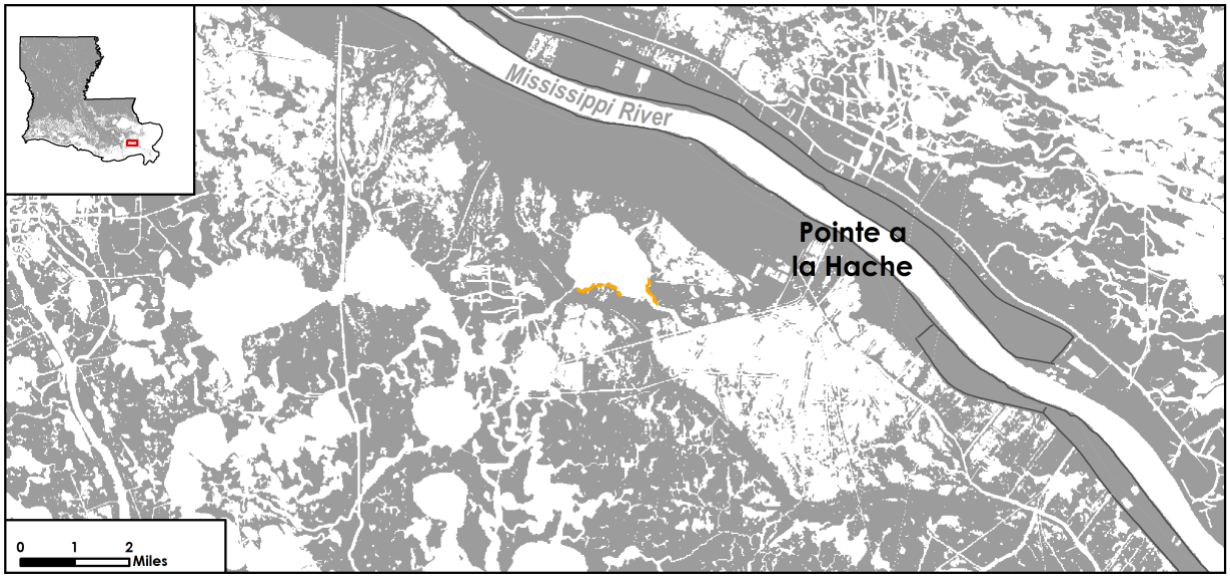

Figure 13. Lake Hermitage Shoreline Protection

This project is located in the Barataria Basin, is consistent with the PDARP/PEIS restoration type (Wetlands, Coastal, and Nearshore Habitats) and restoration approach (Create, Restore, and Enhance Coastal Wetlands), has a clear nexus to the injury that occurred in Louisiana, and can be reasonably expected to directly restore for ecosystem level injuries in the Barataria Basin. This project is included in the 2017 CMP.

The 2017 CMP project cost estimate includes $500,000 for planning/engineering and design, 5,900,000 for construction, and $8,100,000 for O+M, for a total cost of $14,500,000.

2.3.3.7.2 Shoreline Protection Example 2: East Snail Bay Shoreline Protection

The East Snail Bay Shoreline Protection project involves the placement of rock breakwaters designed to an elevation of 3.5 feet NAVD88 along approximately 7,300 feet of the northeastern shore of Snail Bay south of Little Lake to preserve shoreline integrity and reduce wetland degradation from wave erosion (Figure 14). This would build or maintain approximately 250 acres of wetland habitat in the near-term (Year 20) and 100 acres in the long-term (Year 50).

Figure 14. East Snail Bay Shoreline Protection

This project is located in the Barataria Basin, is consistent with the PDARP/PEIS restoration type (Wetlands, Coastal, and Nearshore Habitats) and restoration approach (Create, Restore, and Enhance Coastal Wetlands), has a clear nexus to the injury that occurred in Louisiana, and can be reasonably expected to directly restore for ecosystem level injuries in the Barataria Basin. This project is included in the 2017 CMP.

The 2017 CMP project cost estimate includes $500,000 for planning/engineering and design, 6,400,000 for construction, and $8,500,000 for O+M, for a total cost of $15,400,000.

2.3.3.7.3 Shoreline Protection Example 3: West Snail Bay Shoreline Protection

The West Snail Bay Shoreline Protection project involves the placement of rock breakwaters designed to an elevation of 3.5 feet NAVD88 along approximately 16,600 feet of the western shoreline of Snail Bay south of Little Lake to preserve shoreline integrity and reduce wetland degradation from wave erosion (Figure 15). This would build or maintain approximately 650 acres of wetland habitat in the near-term (Year 20) and 200 acres in the long-term (Year 50).

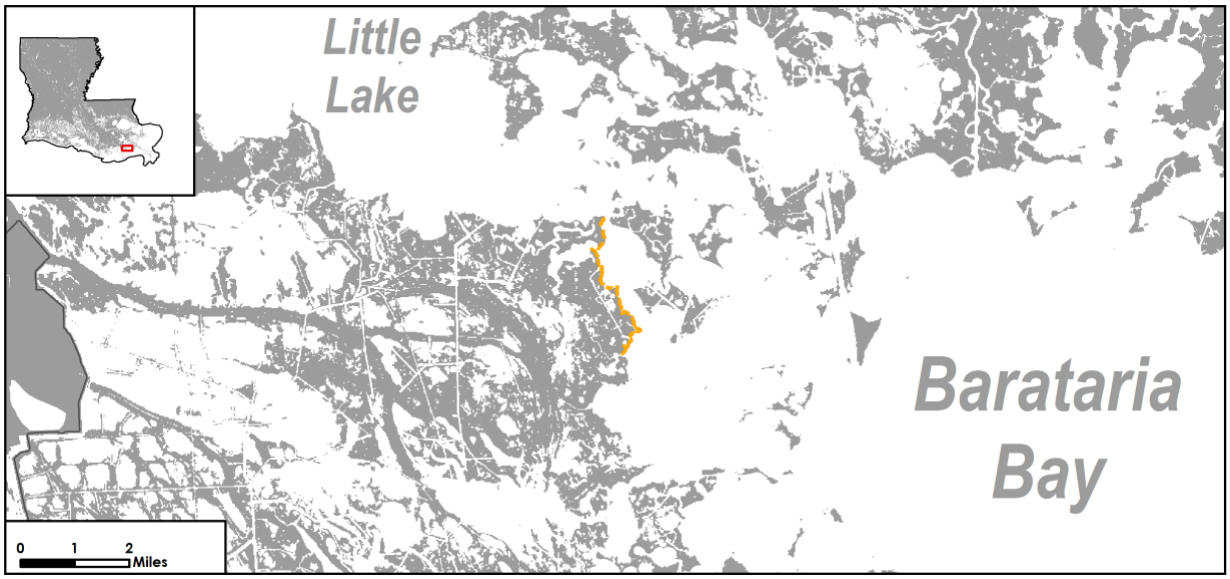

Figure 15. West Snail Bay Shoreline Protection

This project is located in the Barataria Basin, is consistent with the PDARP/PEIS restoration type (Wetlands, Coastal, and Nearshore Habitats) and restoration approach (Create, Restore, and Enhance Coastal Wetlands), has a clear nexus to the injury that occurred in Louisiana, and can be reasonably expected to directly restore for ecosystem level injuries in the Barataria Basin. This project is included in the 2017 CMP.

The 2017 CMP project cost estimate includes $1,100,000 for planning/engineering and design, $14,100,000 for construction, and $14,700,000 for O+M, for a total cost of $29,900,000.

2.3.3.7.4 Shoreline Protection Example 4: Bayou Perot Shoreline Protection

The Bayou Perot Shoreline Protection project involves the placement of rock breakwaters designed to an elevation of 3.5 feet NAVD88 along approximately 5,900 feet of the western shore of Bayou Perot to preserve shoreline integrity and reduce wetland degradation from wave erosion (Figure 16). This would build or maintain approximately 250 acres of wetland habitat in the near-term (Year 20) and 100 acres in the long-term (Year 50).

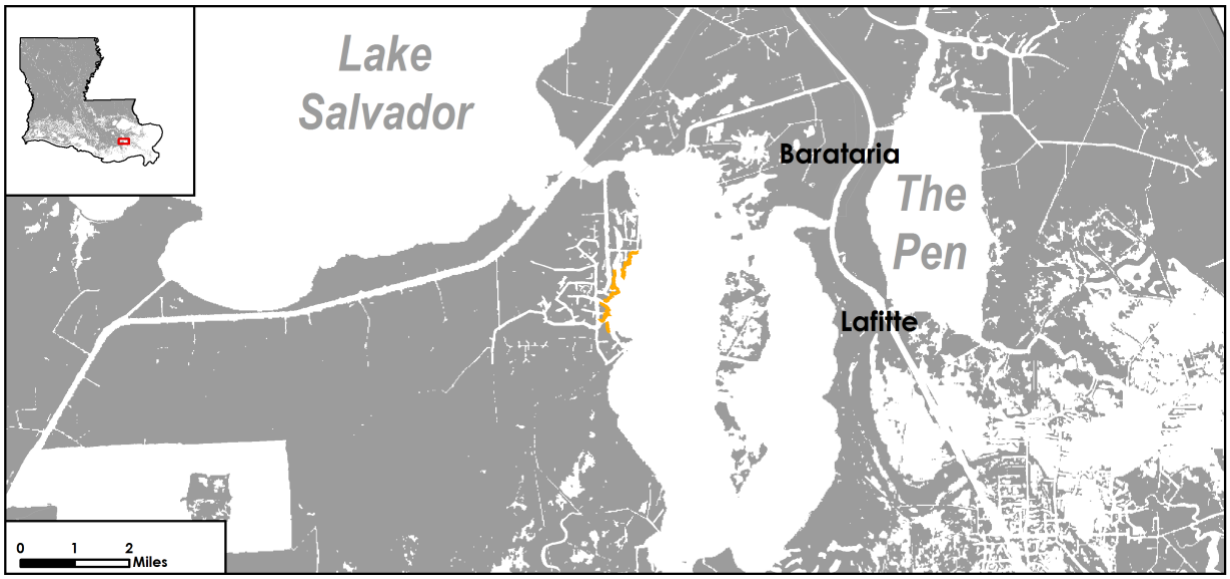

Figure 16. Bayou Perot Shoreline Protection

This project is located in the Barataria Basin, is consistent with the PDARP/PEIS restoration type (Wetlands, Coastal, and Nearshore Habitats) and restoration approach (Create, Restore, and Enhance Coastal Wetlands), has a clear nexus to the injury that occurred in Louisiana, and can be reasonably expected to directly restore for ecosystem level injuries in the Barataria Basin. This project is included in the 2017 CMP.

The 2017 CMP project cost estimate includes $400,000 for planning/engineering and design, $5,500,000 for construction, and $7,500,000 for O+M, for a total cost of $13,400,000.

2.3.4 Step 4: Development of Strategic Restoration Alternatives

The LA TIG is responsible for identifying a reasonable range of restoration alternatives to carry forward for further analysis pursuant to OPA and NEPA. After reviewing the restoration project examples and the restoration approaches and techniques that these projects represent, the LA TIG identified four strategic alternatives that combine these approaches and techniques in a logical manner. With the exception of the natural recovery/No-Action Alternative, each of these alternatives meets the SRP/EA's purpose and need to "restore ecosystem-level injuries in the Gulf of Mexico through restoration of critical wetlands, coastal, and nearshore habitat resources and services in the Barataria Basin" The four alternatives are as follows:

Alternative 1: Marsh creation and ridge restoration plus large-scale sediment diversion

Alternative 2: Marsh creation and ridge restoration plus shoreline protection

Alternative 3: Marsh creation and ridge restoration

Alternative 4: Natural recovery/No-Action

These strategic restoration alternatives are described and evaluated in Section 3.0.

2.3.5 Alternatives Not Considered for Further Evaluation in this Plan

The LA TIG considered including an alternative that would only involve large-scale sediment diversion and an alternative that would only include shoreline protection. These potential alternatives were not carried forward for further evaluation in this plan because as stand-alone techniques they do not meet the LA TIG's need to restore ecosystem-level injuries in the Gulf of Mexico in a timely fashion. A large-scale sediment diversion on its own could delay benefits for 10 or more years, given the longer time horizon for project planning, design and construction and the time required to begin to build habitat from the diverted sediment. Shoreline protection on its own provides only localized benefits and would not restore ecosystem-level injuries in the Gulf of Mexico. In addition, the LA TIG notes that it has already initiated implementation and further evaluation of marsh creation and ridge restoration projects in Barataria Basin. The Lake Hermitage marsh creation project has already been implemented, with funding available through Phase I of Early Restoration. The Spanish Pass Increment of the Barataria Basin Ridge and Marsh Creation has been carried forward for further engineering and planning in the first LA TIG restoration plan (Louisiana Trustee Implementation Group, 2017).

3.0 OPA and NEPA Evaluation of Alternatives

3.1 Introduction

According to the NRDA regulations under OPA, trustees are responsible for identifying a reasonable range of restoration alternatives (15 CFR § 990.53(a)(2)) that can be evaluated according to the OPA evaluation standards (15 CFR § 990.54). Section 2 described the screening of projects and the identification of a reasonable range of alternatives for evaluation under OPA. The following section describes the LA TIG's analysis of these alternatives pursuant to the OPA evaluation standards and pursuant to NEPA. This evaluation process is informed by the OPA criteria found in 15 CFR 990.54(a), as well as the Final PDARP/PEIS and public comments, including those received in response to the NOS.

The OPA criteria include the following:

- The cost to carry out the alternative;
- The extent to which each alternative is expected to meet the goals and objectives of returning the injured natural resources and services to baseline and/or compensating for interim losses;
- The likelihood of success of each alternative;
- The 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;
- The extent to which each alternative benefits more than one natural resource and/or service; and
- The effect of each alternative on public health and safety.

For each alternative, the LA TIG evaluated each OPA criteria independently, and made a determination regarding how well the alternative met each criterion. The text below provides a narrative summary of each alternative's evaluation with respect to those criteria. The LA TIG also evaluated each alternative for direct, indirect, and cumulative environmental impacts, by incorporating the analyses from the PDARP/PEIS and from the analysis under OPA, where appropriate, consistent with NEPA.[7]

[7] To limit repetition in the discussion of alternatives in this document, the analysis of impacts under NEPA were considered to inform the Trustees evaluation of alternatives' potential for collateral injury, extent to which the alternative benefits more than one resource and/or service, and potential impact on public safety. The analyses under NEPA was similarly informed by the same OPA discussion.

For the preferred alternative, the TIG intends to conduct further, more detailed OPA and NEPA evaluation of individual projects or groups of projects in subsequent Phase II plans.

3.1.1 The Cost to Carry Out the Alternative

This criterion evaluates whether or not the costs of the alternative are reasonable, appropriate, and comparable to other equivalent restoration alternatives. Because the alternatives analyzed in this SRP/EA are strategic alternatives, and not project-specific alternatives, the Trustees are unable to estimate a total cost at this point for each alternative. However, the Trustees do have costs available for the individual projects that pertain to each alternative. The costs presented in this SRP/EA for these projects were developed for the 2017 CMP. The CPRA Engineering Division developed cost estimates for each project included in the 2017 CMP; these cost estimates are typically based on the conceptual design of known project features, historical bid and cost data, and other standardized cost methodologies. When applicable, unit prices from recently bid projects or completed study values from other coastal programs were also used to develop unit-cost parameters. All cost estimates and unit costs are in 2015 dollars. More information on the methodology and assumptions in developing 2017 CMP cost estimates can be found in Appendix A to the 2017 CMP.

The Trustees used the costs available for the individual projects from the 2017 CMP to evaluate the cost-reasonableness of each strategic alternative, based on the reasonableness of the combined project costs.

3.1.2 The Extent to Which Each Alternative is Expected to Meet the Goals and Objectives of Returning the Injured Natural Resources and Services to Baseline and/or Compensating for Interim Losses

The LA TIG analyzed the extent to which each alternative is expected to meet the restoration goals for the wetlands, coastal, and nearshore habitats restoration type as described in the Final PDARP/PEIS, which include:

- Restore a variety of interspersed and ecologically connected coastal habitats.
- Restore for injuries to habitats in the geographic areas where the injuries occurred, while considering approaches that provide resiliency and sustainability.
- Restore habitats in appropriate combinations for any given geographic area.

To complete this analysis, the LA TIG evaluated the nature, magnitude, and distribution of benefits expected to be provided to the public by each alternative. At the current stage of development of most individual projects considered in this SRP/EA, the LA TIG does not have the benefit of detailed modeling for benefits associated with food web dynamics and nutrient cycling. Therefore, the LA TIG used the amount of habitat created and sustained as the primary measure of benefit for each alternative. The LA TIG used the analysis available in the 2017 CMP to support this evaluation. Measures of the nature of benefits include the type of habitat created; measures of magnitude of benefits can include number of acres of habitat created by the individual project examples within each alternative.

3.1.3 The Likelihood of Success of Each Alternative

The likelihood of success of each strategic alternative will depend on the likelihood of success for the individual projects incorporated into the alternative and on the interactions between or among the different restoration approaches and techniques incorporated into the alternative. Considerations likely leading to success are dependent on alternative types. Some considerations include:

- Does the alternative propose a restoration approach or technique that has been previously executed successfully?
- Has the alternative been modeled using best available science?
- Does the alternative incorporate measures to minimize risk and uncertainties?
- Will the alternative be resilient to expected future environmental change?

The LA TIG relied on the analysis for each of the project examples in the 2017 CMP (including predictive models, future environmental scenarios, planning tools, modeling efforts, habitat suitability indices, etc. as described in Section 1.2.4 of the 2017 CMP) to evaluate the likelihood of success of each of the alternatives.

3.1.4 The 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

This analysis will consider whether each restoration alternative has direct or indirect collateral environmental impacts. For this SRP/EA, the Trustees analyzed the extent to which the restoration approaches and techniques incorporated into the strategic alternative will prevent future injury or avoid collateral injury, based on the generalized results of model outputs from the CMP that include projections of how restoration projects will affect key habitat parameters such as amount of habitat created or maintained, water level, and salinity.

3.1.5 The Extent to Which Each Alternative Benefits More than One Natural Resource and/or Service

Restoration of coastal marsh provides benefits to the extensive network of natural resources that depend on coastal marshes for all or part of their lifecycle. At the current stage of development of most individual projects considered in this SRP/EA, the LA TIG does not have the benefit of detailed modeling for benefits associated with food web dynamics and nutrient cycling. Therefore, the LA TIG used the amount of habitat created and sustained as the primary measure of benefit for each alternative, which will benefit the natural resources that depend on these habitats, such as estuarine-dependent water-column resources, and contribute to the overall health of the northern Gulf of Mexico ecosystem. The LA TIG used the analysis available in the 2017 CMP to support this evaluation.

3.1.6 The Effect of Each Alternative on Public Health and Safety

The LA TIG considered whether there are any aspects of each alternative that could adversely affect public health and safety that cannot be mitigated.

3.1.7 Approach to NEPA Environmental Effects Analysis

NEPA provides a framework for federal agencies to determine if their proposed actions have significant environmental effects and related social and economic effects, consider these effects when choosing between alternative approaches, and inform and involve the public in the environmental analysis and decision-making process. Federal agencies are encouraged to tier subsequent, narrower analyses from a PEIS to eliminate repetitive discussions of the same issues and focus on the actual issues ripe for decision at each level of environmental review (40 CFR § 1502.20, 40 C.F.R. § 1508.28). In the PDARP/PEIS, the Trustees analyzed the potential benefits and impacts from the restoration approaches and techniques discussed in this SRP/EA. In addition to the discussion under OPA in Chapter 5, Chapter 6 evaluated impacts to physical resources, biological resources, socioeconomic resources, cumulative impacts, and impacts to climate change. (For example, see Sections 6.3, 6.4.1, 6.4.1.2, 6.6, 6.10-6.13). At the time the PDARP/PEIS was drafted, the Trustees had already undertaken a large public outreach and scoping process to identify potential projects during DWH Early Restoration. During that scoping process, most, if not all, of the projects and restoration techniques in this SRP/EA were identified, including those in the CMP. Thus, when analyzing the impacts of particular restoration approaches and techniques in the PDARP/PEIS, the potential restoration projects were known to the Trustees and were used to inform the development of restoration approaches included in the PDARP/PEIS. This EA incorporates by reference the discussion from the PDARP/PEIS to avoid unnecessary repetition of the same issues. In making its comparison of alternatives, the Trustees evaluated all the impacts and benefits identified in the PDARP/PEIS.

The LA TIG has determined that the discussion of potential environmental impacts in the PDARP/PEIS is a thorough analysis of the potential range of impacts from the alternatives considered here, and there is no significant new information relevant to environmental concerns or impacts. Furthermore, because the Trustees are not selecting any specific projects for construction, there is no irretrievable commitment of resources beyond those necessary for evaluation and planning for future restoration plans. Potential range of programmatic impacts from restoration planning were also addressed in the PDARP/PEIS, including those from the restoration approaches analyzed in this plan, see Section 6.4.14. Thus, there has been no additional commitment of resources beyond those already contemplated and assessed in the PDARP/PEIS for resource planning.

Consistent with the CEQ's views on the flexible purposes of EAs (40 CFR 1501.3(b, the LA TIG structured the EA to support the decision being made in the SRP/EA, mindful that the SRP/EA would be followed by Phase II project-specific restoration plans and NEPA analyses. The LA TIG designed this EA to focus on and evaluate the environmental effects of the strategic restoration alternatives proposed in the SRP. In evaluating those alternatives, the LA TIG relied substantially on, tiered to, and incorporated by reference relevant portions of the PDARP/PEIS. It also reviewed and evaluated all public comments. Based on its review, the LA TIG is satisfied that it has sufficient relevant environmental information to understand the effects of the range of

restoration alternatives considered in the SRP. The LA TIG has completed a comparative review and analysis of these effects and understands the relative environmental impacts of each restoration alternative.

Public comments, however, made recommendations for data to be gathered and evaluated in Phase II restoration planning and NEPA analyses.

The LA TIG will develop additional project-specific information for any restoration projects selected in furtherance of this Final SRP/EA now or in the future. That information will be used to evaluate the environmental impacts of those projects in a subsequent restoration plan and NEPA analysis. The nature and scope of these impacts will depend on how projects are proposed for design, operation, and siting

3.2 OPA and NEPA Evaluation of Alternatives

3.2.1 Alternative 1: Marsh Creation and Ridge Restoration Plus Large-scale Sediment Diversions

3.2.1.1 Alternative Description

Under this alternative, the Trustees would support a suite of restoration projects in the Barataria Basin, including projects that would create marsh and restore ridges together with the construction of large-scale sediment diversions to restore deltaic processes. Marsh creation projects directly restore wetland habitat; these projects are typically located in areas that have historically supported marsh habitat, but the marsh has been lost due to natural and human induced causes. Ridge restoration projects are designed to complement marsh creation projects by protecting the marshes from further losses due to storm surge and wave action. These projects re-establish historical ridge features within the marsh complex that are important to the complex hydrology and habitat diversity of the Barataria Basin. Large-scale sediment diversions create significant additional marsh areas and also increase the lifespan of newly created marsh areas by reestablishing hydrologic process that provide a consistent, sustainable source of sediment.

This alternative involves a combination of restoration approaches and techniques identified in the PDARP/PEIS. First, the alternative includes projects that pertain to the identified restoration technique "Create or enhance coastal wetlands through placement of dredged material", which is part of the more general restoration approach to "Create, restore, and enhance coastal wetlands." Second, the alternative includes the restoration approach to "Restore and preserve Mississippi-Atchafalaya River processes" with a focus on large-scale sediment diversions.[8] The goal of this alternative is to increase the function, extent, and sustainability of the highly productive habitats in the Barataria Basin through a complementary suite of restoration projects that interact to

[8] See Section 2.3.3.1 for a discussion of how large-scale sediment diversions differ from small-scale sediment diversions and why the LA TIG has eliminated the implementation of one or more small-scale diversions from further consideration of strategic alternatives for restoring the ecosystem injury in Barataria Basin.

provide both short-term and long-term benefits to injured resources throughout the Gulf of Mexico.

The Trustees have identified a series of example projects that would meet the objectives of this alternative, if implemented. These projects were described in Section 2.3.3. and include two large-scale sediment diversion projects (Mid-Barataria Sediment Diversion and the Ama Sediment Diversion), two marsh creation projects (Large Scale Marsh Creation and Lower Barataria Marsh Creation), four ridge restoration projects (Grand Bayou Ridge Restoration, Bayou Eau Noire Ridge Restoration, Adams Bay Ridge Restoration, and Red Pass Ridge Restoration), and one combined ridge restoration and marsh creation project (Spanish Pass Increment of the Barataria Basin Ridge and Marsh Creation). All of these projects were included in the 2017 CMP. The Trustees may choose to move forward with future Phase II restoration plans that incorporate one or more of these projects. The Trustees may also identify additional similar restoration projects in the future that would correspond to this alternative.

If marsh creation, ridge restoration, and large-scale sediment diversion projects are built together as part of a comprehensive restoration strategy for the Barataria Basin, it is important to consider the sequencing of these projects to maximize benefits to the Barataria Basin ecosystem with the greatest efficiency. For example, marsh creation or ridge restoration projects can be built most efficiently utilizing nearby borrow areas. If there are borrow areas that would become depleted in sediment after the construction and operation of a potential future diversion structure (e.g., Brown et al., 2013), then it is most efficient to use those borrow areas for marsh creation or ridge restoration in advance of its construction. Without this sequencing, potential marsh creation or ridge restoration projects would need to be supplied with sediment from a more distant source at greater expense. Wiegman et al. (2017) used a Mississippi River Delta Plain marsh elevation model to assess the costs of hydraulic dredging to sustain wetlands from 2016 through 2100 under a range of sea level rise, energy price, and management scenarios. They predicted up to an 8-fold increase in dredging costs as energy prices increased over time, which would be amplified if borrow sources were located farther from the site of marsh creation or ridge restoration. Thus, there is both a cost and a practical advantage to sequencing restoration by implementing marsh creation or ridge restoration projects using the proximal borrow sources in the Mississippi River first, followed by potential future construction of the diversion.

3.2.1.2 OPA Evaluation

3.2.1.2.1 The Cost to Carry Out the Alternative

Because this alternative is a strategic alternative, the Trustees are unable to estimate a total cost at this point.[9] However, the total cost of all the project examples currently included in this alternative is $3,821,600,000. This includes $2,282,300,000 for large-scale sediment diversion, $1,384,100,000 for marsh creation, and $155,200,000 for ridge restoration projects. These cost

[9] The Trustees do not anticipate using NRDA funding to implement all of the project examples discussed in this alternative.

estimates include costs that would be covered by non-NRDA funding sources, such as NFWF's GEBF.

3.2.1.2.2 The Extent to Which the Alternative is Expected to Meet the Goals and Objectives of Returning the Injured Natural Resources and Services to Baseline and/or Compensating for Interim Losses

Marsh creation projects through the placement of dredged materials can be implemented quickly, targeted to specific locations with currently degraded habitat, and have a track record of success within Louisiana. These projects directly compensate for injuries to wetland habitat resources and services in Barataria Basin, as well as providing habitat for other injured resources that benefit from these marsh habitats. CPRA (alone and in conjunction with other agency partners) has built more than 8,700 acres of marsh since 2007 through marsh creation projects, and currently has more than 14,800 benefit acres in engineering and design. All of the habitat restoration projects funded through the CWPPRA program, including marsh creation, undergo rigorous monitoring (see: https://www.lacoast.gov/), which allows the LA TIG to use lessons learned from previous projects to increase the likelihood of success.

Ridge restoration projects are intended to reestablish historical ridges through sediment placement and vegetative plantings. Although these projects provide minimal surge protection, they can provide some wave attenuation within the basin (Corbell et al., 2013). This type of habitat is regionally scarce, due to the erosion of historical ridges, so implementing ridge restoration helps reestablish the diversity of habitat types that comprise a healthy and functioning Barataria Basin ecosystem. Two ridge restoration projects have already been implemented in the Barataria Basin through the CWPPRA program, which allows the LA TIG to benefit from lessons learned.

The long-term sustainability of marsh creation projects is affected by the balance between forces acting against the marsh (e.g., subsidence, sea level rise, and marsh edge erosion) and the accretion of mineral and organic sediments that together maintain the marsh's elevation relative to the water level. Without a connection between the river and the basin, new sediment is not introduced to the marsh creation site(s) during natural river flooding cycles. Further, depending on the location within the Barataria Basin, marsh creation projects can be subject to high subsidence rates and high wave energy. Without continuous input of substantial amounts of sediment to counteract these processes, a large portion of the existing and created marshes in the Barataria Basin are projected to be lost over the coming decades as project sites succumb to sea level rise, subsidence, and other environmental factors.

As part of planning for large-scale restoration in the Barataria Basin, CPRA has already conducted feasibility studies to evaluate how marsh creation projects and large-scale sediment diversions could work in synergy to maximize the benefits of habitat creation in the Barataria Basin. Modeling developed for the CMP demonstrates that marsh creation projects, when built along with a large-scale sediment diversion projects, yield more net habitat gain than developing either in isolation (CPRA, 2017; see pp. 133-134). Marsh creation projects can build habitat relatively quickly, and once built can help to retain the sediment being introduced into the basin by the diversion. At the same time, the influx of sediment from the diversion will help make the marsh creation projects more sustainable over the long term, by providing a continuous source of

sediment, freshwater, and nutrients to maintain marsh growth. Controlled large-scale sediment diversions also have the potential to offset impacts from relative sea level rise in the Barataria Basin, by providing a sustainable source of sediment to replenish land as it is inundated.

Large-scale sediment diversions also provide a broader ecosystem-scale benefit, by re-establishing the deltaic processes that deliver sediment, freshwater, and nutrients in a long-term, resilient, and sustainable way. Furthermore, the magnitude of restoration that occurs with large-scale sediment diversions is much larger than other restoration techniques. As an example, the project-specific Delft-3D modeling shows that the MBSD may build/maintain approximately 30,000 acres of marsh habitat over 50 years, compared to 7,000 to 12,000 acres that could be created upon construction of marsh creation projects, and 100-500 acres of habitat created upon the construction of the ridge restoration projects. Large-scale sediment diversions projects therefore provide ecosystem-scale benefits by re-establishing the deltaic processes that initially built the marshes in the Barataria Basin.

Based on this analysis, this alternative would restore a variety of interspersed and ecologically connected coastal habitats, because the combination of marsh creation, ridge restoration, and large-scale sediment diversion techniques would build/maintain marsh and ridge habitat across a large area of the Barataria Basin. Re-establishing the deltaic processes that deliver sediment, freshwater, and nutrients improves the function of existing habitats. This alternative also provides resiliency and sustainability for restoring wetlands, coastal and nearshore habitats because large-scale sediment diversions and marsh creation and ridge restoration together yield a greater net gain than any technique individually. By increasing the function, extent, and sustainability of the highly productive wetland habitats in Barataria Basin, this alternative would address injuries in the Gulf of Mexico ecosystem that depend on productive wetlands. This alternative would restore for injuries in the Barataria Basin, where the greatest oiling injuries in Louisiana occurred.

3.2.1.2.3 The Likelihood of Success of the Alternative

More than 120 marsh creation and ridge restoration projects have been implemented across Louisiana by CPRA and through the CWPPRA program, including 30 projects in Barataria Basin. Project-level monitoring indicates that these projects have successfully restored and protected habitat as intended. The LA TIG is also able to benefit from lessons learned through these previous projects to increase the likelihood of success for future projects. The combination of marsh creation, ridge restoration, and sediment diversions is expected to increase the overall likelihood of success for this alternative, because the marsh creation and ridge restoration components can build habitat quickly, while the sediment diversion component can help to make this new habitat sustainable. The expected diversity of habitats created will provide increased physical and biological resiliency to the system, through increased habitat function, wave attenuation and creating refuges of higher land elevation for terrestrial biological resources. As noted in the PDARP/PEIS, “By identifying opportunities to restore multiple habitats within one project, or to implement multiple projects within a given area, the Trustees believe they may accelerate recovery of injured ecosystem functions and achieve a more integrated restoration of the nearshore ecosystem and its service flows.” In addition, the wetland restoration envisioned for Barataria Basin in this alternative “can provide important nursery areas for the production of larval fishes and crustaceans, resulting in increased production of ecologically, recreationally, and

commercially important species (Minello and Webb Jr., 1997; Peterson and Turner, 1994). Numerous marsh birds and wading birds also benefit from the invertebrate production stimulated by coastal wetland productivity (Greenberg et al., 2006)" (PDARP/PEIS, Section 5.5.2.2).

Implementing a large-scale sediment diversion in conjunction with marsh creation and ridge restoration would increase the sustainability and likelihood of success for each type of restoration project. Existing and proposed marsh creation projects would benefit from large-scale sediment diversions being implemented because they would be sustained by the delivery of sediment, freshwater, and nutrients from diversion projects. A comprehensive monitoring and adaptive management process for all of the restoration techniques, and especially for the large-scale sediment diversion, is a critical element for maximizing ecosystem benefits, minimizing risk and addressing uncertainties on an ongoing basis. As more information is gained about how the large-scale sediment diversion functions under different conditions, operation of the diversion can be adaptively managed to maximize benefits and minimize impacts.

As noted in the PDARP/PEIS and modeling in the 2012 and 2017 CMP (see Cobell et al., 2013; Couvillion et al., 2013; Lewis et al., 2016; Visser et al., 2017; Wang et al., 2014a, 2017a, b), and considering the scale of oil spill impacts, the Trustees understand that restoration of Barataria Basin hydrologic processes can increase the long-term resiliency and sustainability of the Gulf ecosystem. The PDARP/PEIS notes that "Diversions of Mississippi River water into adjacent wetlands have a high probability of providing these types of large-scale benefits for the long-term sustainability of deltaic wetlands. If correctly designed, sited, operated, and adaptively managed diversions will help restore injured wetlands and resources by reducing widespread loss of existing wetlands through: 1) reintroducing nutrients and freshwater into salt-stressed, nutrient-starved ecosystems (Allison and Meselhe, 2010; Allison et al., 2012, 2013; Kolker et al., 2012; Nittrouer et al., 2012); and 2) increasing sediment deposition to partially offset relative sea level rise and help build and maintain habitats (Andrus, 2007; Day et al., 2012; DeLaune et al., 2003; DeLaune et al., 2013; Kemp et al., 2014; Kolker et al., 2012; Lane et al., 2006; Wang et al., 2014a, 2017b)." The PDARP/PEIS further notes that "diversions will help maintain the Louisiana coastal landscape and its ability to overcome other environmental stressors by stabilizing wetland substrates; reducing coastal wetland loss rates; increasing habitat for freshwater fish, birds, and benthic communities; and reducing storm risks, thus providing protection to nearby infrastructure (Barbier et al., 2013; Day et al., 2012; Day et al., 2009; DeLaune et al., 2013; Falcini et al., 2012; Roberts et al., 2015; Rosen and Xu, 2013)." Controlled large-scale sediment diversions also have the potential to help habitats keep pace with relative sea level rise in the Barataria Basin, by providing a sustainable source of sediment to replenish land as it is inundated (Wang et al., 2014a, 2017b).

Thus, the combination of the large-scale sediment diversion and marsh creation and ridge restoration techniques increases the likelihood of long-term restoration success for this alternative.

3.2.1.2.4 The Extent to Which the Alternative will Prevent Future Injury as a Result of the Incident and Avoid Collateral Injury as a Result of Implementing the Alternative

Marsh creation projects in Barataria Basin can help prevent future erosion injuries to marsh vegetation and soils in areas that suffered increased erosion as a result of the DWH oil spill. Restoration of marsh habitat also helps prevent future injury to estuarine-dependent resources, such as fish, crustaceans, and marsh birds, that lost supporting habitat through the oil spill and through subsequent increased erosion. Ridge restoration projects also help prevent future injury to estuarine-dependent resources by helping to increase the longevity of surrounding marsh. Overall, the marsh creation and ridge restoration components of this alternative would help prevent future injury to impacted resources by providing habitat for many ecologically and economically important animals, including fish, shrimp, shellfish, birds, and marine mammals, in the form of food, shelter, breeding, and nursery habitat.

There is some potential for collateral injury from the construction of the marsh creation and ridge restoration techniques in this alternative. As noted in the PDARP/PEIS, short-term and long-term, minor to moderate adverse impacts on the physical environment would result from construction activities related to creating, restoring, and enhancing coastal wetlands. Long-term, minor adverse indirect impacts on the physical environment could occur from the placement of dredged material in shallow water areas, which may affect sediment dynamics. Placement of ridge restoration materials would result in long-term, but localized, adverse impacts to the existing substrate.

In addition, as noted in the PDARP/PEIS, "short-term, minor to moderate adverse impacts to the biological environment could occur during construction activities related to: 1) disturbance to wetland vegetation during construction; and 2) displacement of land-based or aquatic faunal species resulting from staging equipment and materials, as well as entrapment of marine mammals. Some applications of this approach could also result in localized, permanent, adverse impacts to shallow intertidal or subtidal habitat—such as that for SAV or oysters, for instance, if fill is placed in these areas to create marsh. These impacts are expected to be confined to the immediate vicinity of the project, and best practices would likely be implemented to minimize adverse impacts."

Large-scale sediment diversions would be designed to allow for controlled release of river water and associated nutrients and sediments into adjacent deltaic wetland areas at prescribed times and rates (Allison and Meselhe, 2010). These controlled releases would help prevent future injuries to a system that suffered increased erosion as a result of the Deepwater Horizon oil spill by reducing and restoring for widespread loss of existing wetlands through: 1) reintroducing nutrients and freshwater into salt-stressed, nutrient-starved ecosystems; and 2) increasing sediment deposition to partially offset relative sea level rise and help build and maintain wetlands (Andrus, 2007; Day et al., 2012; DeLaune et al., 2003; DeLaune et al., 2013; Kemp et al., 2014; Kolker et al., 2012; Lane et al., 2006; Wang et al., 2014a). Further, available studies indicate that deposition from these large-scale sediment diversion projects can keep pace with relative sea level rise and build healthy marshes (e.g., Lane et al., 2006; Day et al., 2009; Teal et al., 2012).

The majority of the field-based studies regarding collateral injury from diversions are focused on the potential impacts of freshwater and nutrients on receiving basins. While both freshwater and

nutrients would be introduced into the ecosystem from a large-scale sediment diversion, it is important to note that large-scale sediment diversions differ from freshwater diversions in both their objectives and their operational regimes. Thus, the potential for collateral injuries of the type described below may be moderated by the operational regime chosen for a large-scale sediment diversion, as well as by the simultaneous introduction of freshwater, nutrients and sediment into the basin. Sediment diversions may result in long-term, broad scale salinity and nutrient shifts in the receiving basin with impacts to resources varying in magnitude based on distance to and operational plans of the diversion.

Existing freshwater diversions, or salinity control structures, provide some insights into potential impacts from a large-scale sediment diversion. These impacts potentially include changes in soil stability (Allison and Meselhe, 2010; Kenney et al., 2013; Teal et al., 2012); salinity shifts within the receiving estuary that may affect the distribution of some estuarine-dependent fish and shellfish species (e.g., de Mutsert and Cowan Jr., 2012; Rose et al., 2014; Rozas and Minello, 2011; Rozas et al., 2005; Soniat et al., 2013); changes in bay, sound, estuary (BSE) marine mammal habitat and/or the health of BSE marine mammals (LaBrecque et al., 2015; Miller, 2003; Miller and Baltz, 2009; Waring et al., 2015); and potential introduction of contaminants into receiving waters. These potential impacts are described in general terms below, based on information available at this time. However, more detailed analysis of how operational regimes might be optimized to maximize land building while minimizing potential adverse impacts would be undertaken in a subsequent Phase II Restoration Plan.

A number of field-based studies suggest that freshwater diversions may contribute to a decrease in soil strength via marsh vegetation impacts to the receiving basins (e.g., Teal et al., 2012). These studies cite decreasing root strength due to a decrease in rooting depth with increased nutrients (e.g., Darby and Turner, 2008; Turner, 2011); decomposition of the root mat due to changes in porewater chemistry (e.g., Swarzenski et al., 2008); or reduction in biomass related to the duration of inundation (e.g., Snedden et al., 2015) as potential mechanisms for reduced wetland resilience associated with diversions. Other studies, however, suggest that the net effect of river diversions is to build stable marshes, and that a combination of organic and inorganic deposition along with vegetative growth each play important roles in the construction of these stable marshes (e.g., DeLaune et al., 2003; Nyman et al., 2006).

Salinity shifts in receiving estuaries due to diversions would also influence aquatic resources within the Barataria Basin. For example, input of freshwater is expected to have short-term adverse impacts to less freshwater-tolerant species, such as brown shrimp, spotted seatrout, and other estuarine-dependent species (e.g., Nyman et al., 2013). These changes could affect the distribution and reproductive patterns of estuarine-dependent fish species (Nyman et al., 2013) and disrupt the nursery functions of the receiving estuary by affecting food and habitat availability (Rozas and Minello, 2011; Rozas et al., 2005). Species such as Gulf menhaden, blue crab, white shrimp, and red drum, which commonly use intermediate salinity areas, SAV habitats, and oyster reefs, could also incur short-term adverse impacts during operation as a result of salinity changes but are anticipated to relocate to appropriate salinities over time. These impacts on fish species could also translate to an impact on recreational and commercial fisheries that would be evaluated by the Trustees in a Phase II plan.

In addition to impacts to aquatic resources due to salinity changes, sediment and turbidity inputs from diversions could also adversely impact estuarine resources in receiving basins. As noted in the PDARP/PEIS, impacts to shellfish related to sediment inflow are possible due to burial or clogging of oysters' feeding apparatus. These impacts would increase mortality, affect reproduction, and affect oyster spat settlement (Soniat et al., 2013). Adverse impacts to current oyster reefs may be moderate to major depending on proximity to the diversion outfall (de Mutsert et al., 2017), especially if spat-producing reefs are buried or otherwise do not provide a spat source for other reefs. Impacts to finfish related to increased turbidity (e.g., gill abrasion), would also result from large-scale sediment diversions, and turbidity increases would also create modified behavior and displacement due to associated physiological stress (Wilber and Clarke, 2001).

Reductions in salinity also have the potential to adversely impact BSE marine mammals, including the stock of bottlenose dolphins in Barataria Bay, possibly resulting in illness and death. Dolphins inhabiting low salinity environments for an extended period of time (multiple days to weeks) experience a number of adverse health effects, including skin lesions due to the disruption of the electrolyte balance in epidermal cells and changes in blood chemistry, such as decreased osmolality, sodium, and chloride levels associated with over hydration (Gulland et al., 2008; Andersen, 1973; Ridgway, 1972; Ortiz, 2001; Ewing et al., 2017). Their eyes may also be affected by swelling in the cornea (Andersen, 1973). In addition, the Barataria Bay stock of dolphins has underlying conditions as a result of the DWH oil spill that may make them more susceptible to illness and death from exposure to low salinity (e.g., Schwacke et al., 2013; Venn-Watson et al., 2015). The resident population of Barataria Bay dolphins, as described by Waring et al. (2013), LeBrecque et al. (2015), and NOAA (2016), is currently being studied by an interagency team to better understand baseline health, population dynamics, reproductive success, habitat use and movement, their behavior and the key environmental parameters influencing their habitat.

It is important to note that at this time, our understanding of impacts to these resources has been evaluated primarily through modeling studies, many of which have high uncertainties (e.g., Ainsworth, 2016). However, models developed in support of the 2017 CMP project changes to salinity, temperature, Chlorophyll a (Chl α), and total suspended solids that could adversely affect many of these estuarine-dependent species (e.g., de Mutsert et al., 2017). Specific projections of these models include localized reductions in biomass for freshwater intolerant species such as spotted seatrout, and Gulf Menhaden. Freshwater inputs could also push the areas with optimal salinities for oysters farther seaward (PDARP/PEIS, Section 6.4.1.2.2).

Based on monitoring of water quality from the Caernarvon and Davis Pond diversions, there is also the potential for chemicals from the Mississippi River to be introduced into the receiving basin of a large-scale sediment diversion (e.g., Caffey et al., 2002; Deegan et al., 2012). Available data indicate that the levels of these contaminants are not high enough to create adverse impacts to species of special concern (Wang et al., 2014b), however, more detailed analysis of potential introduction of contaminants into receiving basins may be warranted as part of a Phase II plan for this project type.

3.2.1.2.5 The Extent to Which the Alternative Benefits More than One Natural Resource and/or Service

Building and sustaining diverse wetland habitats in the Barataria Basin, including marshes and ridges, would benefit multiple resources because coastal wetlands provide a range of ecological functions and services, including providing important habitat for fish and wildlife species, improving water quality, stabilizing shorelines, reducing storm-surge risk, and capturing and storing carbon in organic soils (Armentano and Menges, 1986; Costanza et al., 2014; Moody and Aronson, 2007; Woodward and Wui, 2001; Zimmerman et al., 2000). Coastal wetlands provide important habitat for fish, benthic communities, birds, and terrestrial wildlife (Nagelkerken et al., 2008; Peterson and Turner, 1994; Robertson and Duke, 1987). They help stabilize substrates and reduce coastal erosion (Gedan et al., 2011). Wetland restoration provides important nursery areas for the production of larval fishes and crustaceans, resulting in increased production of ecologically, recreationally, and commercially important species (Minello and Webb Jr., 1997; Peterson and Turner, 1994). Numerous marsh birds and wading birds benefit from the invertebrate production stimulated by coastal wetland productivity (Greenberg et al. 2006). Another benefit of coastal wetland systems is their ability to mitigate storm risk, providing protection to nearby infrastructure and coastal communities, particularly during low-energy storm events (Costanza et al., 2014; Costanza et al., 2008). Improved wetlands would also provide ancillary benefits to human users through increased opportunities for recreational activities (Zedler and Leach, 1998).

Because large-scale sediment diversions are a long-term strategy to maintain habitat, they provide potential benefits that complement the marsh creation and ridge restoration approaches included in this alternative. Large-scale diversions can benefit multiple habitats and resources because they will sustain and create thousands of acres of wetland habitat. The introduction of sediment, freshwater, and nutrients as a result of large-scale sediment diversions would provide ecosystem-level benefits to the entire basin and the Gulf of Mexico.

As summarized above, the introduction of freshwater from large-scale sediment diversions decreases modeled habitat suitability for species that prefer higher salinity, such as spotted seatrout and small juvenile brown shrimp. However, these modeled changes in salinity also increase habitat suitability for species that prefer lower salinity such as largemouth bass and green-winged teal. Ecosystem modeling (de Mutsert et al., 2017; Lewis et al., 2016) projects a redistribution of prey items for dolphins within Barataria Basin based on modeled changes to salinity, but overall the models project a minimal impact on the total biomass of the fish and fishery prey items of dolphin within the Mississippi River Delta. Modeled salinity reductions also increase habitat suitability for small juvenile brown shrimp and oyster in parts of the lower Barataria Basin relative to the FWOA, since salinities in these areas are projected to become higher than optimal for these species in the FWOA. This effect is most extensive when saltwater intrusion is greatest during the FWOA (i.e., during the latter part of the 50-year simulations and particularly for the "high" environmental scenario). Modeling indicates that diversions also help maintain large areas of solid marsh in upper Barataria Basin, which results in decreased habitat suitability for species that favor open water or fragmented marsh (CPRA, 2017).

3.2.1.2.6 The Effect of the Alternative on Public Health and Safety

There would likely be a positive net effect on public health and safety by providing natural storm protection for surrounding communities. Coastal marshes have significant positive effect on wave attenuation and shoreline stabilization (Shepard et al., 2011). Large marshes that contain dense and productive (i.e., high biomass production) vegetation attenuate wave energy and stabilize shorelines more effectively than deteriorating or severely altered marshes (Shepard et al., 2011), and loss of wetlands can result in increased storm surge risk (Wamsley et al., 2010). The 2017 CMP modeling projects show that the wetlands created and sustained by the operation of large-scale sediment diversions can lower storm surge enough to potentially reduce levee overtopping farther inland (CPRA, 2017). Restoration projects can reduce water level due to storm surge and waves by as much as 1 meter in some locations (Cobell et al., 2013; CPRA, 2017). Investments in wetland restoration in Louisiana could reduce the future vulnerability of the coast to periodic hurricane storm surges and decrease the risk of substantial flood damages to residential property (Barbier et al., 2013; Wamsley et al., 2010).

This alternative could have an adverse impact on the public health and safety of communities, which could be subject to potential for increased water surface elevation and related impacts to individuals and communities. This is particularly a concern for communities that are outside of Louisiana's structural flood protection system. Potential flooding-risk increase could be mitigated with additional structural and non-structural measures. Subsequent Phase II restoration planning for a large-scale sediment diversion project will include a thorough analysis of these potential impacts to public health and safety and options for potential mitigation of these impacts.

3.2.1.2.7 Approach to NEPA Environmental Effects Analysis

The PDARP/PEIS completed a programmatic analysis in order to capture the benefits and impacts from proposed restoration approaches, including approaches that encompass large-scale sediment diversions, marsh creation and ridge restoration projects. Sections 1.0 and 3.1.7 provide an explanation for the LA TIG's approach to the NEPA analysis for the SRP/EA. A brief summary of the impacts associated with the restoration approach that encompasses large-scale sediment diversions, as summarized in the PDARP/PEIS (Section 6.4.1), is incorporated by reference and summarized as follows:

- Localized, long-term, minor to moderate adverse impacts to sediments and geology are possible at the diversion construction site as the structure(s) is installed.
- Short-term, moderate adverse impacts to surface water quality are possible during diversion operation, which may reduce salinity, alter oxygen concentrations, and increase turbidity. Although considered adverse here, these water quality changes related to sediment and freshwater influx would be similar to those that occur during natural high flow events and are intended to mimic historical delta-building processes.
- Diversions will periodically increase freshwater and sediment input to the receiving estuary, which can lead to changes in water temperature, clarity, oxygen and nutrient concentrations, and salinity, at least for the duration of the operation of the diversion and for some period of time after the diversion is closed. During these periods of water quality changes, short-term and some potentially long-term, moderate to major

adverse impacts to biological resources are possible depending on the level and duration of stress on their biological functions.

- Conversely, long-term, moderate to major benefits to biological resources are also anticipated as a result of the restoration of deltaic processes that would increase the resilience of habitat for numerous species. Long-term increases in marsh acreage and health and long-term benefits in the form of restored deltaic processes are expected.
- Adverse impacts to current oyster reefs may be moderate to major and long-term depending on proximity to the diversion outfall and on operations, especially if spat-producing reefs are buried or otherwise do not provide a spat source for other reefs.
- Benefits to oyster resources located in higher salinities, however, may result from freshwater inputs, which could reduce salinities and thus the potential for dermo infections (infection by the protozoan parasite *Perkinsus marinus*) and predation by oyster drills (*Stramonita haemastoma*), both of which are major threats to oyster survival and productivity in high-salinity areas.
- Impacts to finfish related to sediment and freshwater diversions may also result due to increased turbidity (e.g., gill abrasion) or modified behavior and displacement due to changing environmental conditions and associated physiological stress (Wilber and Clarke, 2001). Adverse impacts at a population level are not anticipated, and most populations will relocate to appropriate habitat.
- Freshwater inflow is an important component of circulation and flushing processes in estuaries, which supports the aquatic food web of marine fishery species by transporting planktonic organisms, nutrients, and detritus to the Gulf of Mexico. Freshwater fishery species, such as crawfish, catfish, largemouth bass, and other sunfish could benefit from this approach due to the increased freshwater input.
- Over the long term, restoration of the Mississippi-Atchafalaya River processes would be expected to result in overall socioeconomic benefits resulting from the preservation and restoration of coastal wetlands, as well as employment opportunities during the construction of such projects. Both short- and long-term adverse impacts to fisheries, such as oysters, could occur, however, as resources and wetlands convert to more freshwater habitats.
- Commercial navigation may be adversely affected by diversion-induced river shoaling.
- Diversions that contribute to the preservation or restoration of wetlands are expected to benefit public and private landowners; however, in the immediate areas of diversions there could be flooding of wetland areas during periods of operation. Over the long term, however, land gain resulting from diversions may provide a buffer from storm surge and sea level rise to help protect coastal communities and landowners.

A brief discussion of the impacts from marsh creation/ridge restoration projects is included in the PDARP/PEIS (Section 6.4.1). Those discussions are incorporated by reference and summarized as follows:

- Short-term and long-term, minor to moderate adverse impacts on the physical environment could result from construction activities related to creating, restoring, and enhancing coastal wetlands.
- Short-term, minor to moderate adverse impacts to the biological environment could occur during construction activities.
- Some applications of this approach could also result in localized, permanent, adverse impacts to shallow intertidal or subtidal habitat—such as that for SAV or oysters, for instance, if fill is placed in these areas to create marsh.
- Marsh creation/ridge restoration projects would provide long-term benefits for many ecologically and economically important animals, including fish, shrimp, shellfish, birds, sea turtles, marine mammals, and terrestrial mammals in the form of food, shelter, breeding, and nursery habitat.
- Minor to moderate, localized adverse impacts to socioeconomic resources could be expected if a project includes protection of lands that otherwise would have been developed for residential housing or commercial uses.
- Implementation of this approach at national, state, and local parks; wildlife refuges; and wildlife management areas could result in short-term, minor adverse impacts to land and marine management due to temporary partial or full closure of areas.
- Improvements in water quality resulting from increased water filtration from these activities could contribute long-term benefits to public health.
- Creating, enhancing, or restoring coastal wetlands could result in minor (temporary disturbance) to moderate (disturbance without loss of cultural information) impacts on cultural and historic resources due to construction activities.

A more-detailed discussion of the beneficial and adverse impacts of sediment diversions and marsh creation/ridge restoration approaches can be found in the PDARP/PEIS Section 6.4.1. Additionally, an analysis of cumulative impacts that was incorporated into this analysis can be found at PDARP/PEIS Section 6.6. These Sections, as well as the analysis of other issues such as climate change discussed in Chapter 6 of the PDARP/PEIS are incorporated by reference. The LA TIG has determined that the discussion of potential environmental impacts in the PDARP/PEIS is a thorough analysis of the potential range of impacts from the alternatives considered here, and there is no significant new information relevant to environmental concerns or impacts.

3.2.2 Alternative 2: Marsh Creation and Ridge Restoration plus Shoreline Protection

3.2.2.1 Alternative Description

Alternative 2 includes marsh creation and ridge restoration projects paired with shoreline protection projects. This alternative includes projects that pertain to the identified restoration technique "Create or enhance coastal wetlands through placement of dredged material", as well as the identified restoration technique "Construct breakwaters"; both of these techniques are part of the more general restoration approach to "Create, restore, and enhance coastal wetlands." The goal of this alternative is to increase the function, extent, and sustainability of the highly

productive habitats in the Barataria Basin through a complementary suite of restoration projects that interact to provide both short-term and long-term benefits to injured resources throughout the Gulf of Mexico.

The Trustees have identified a series of example projects that would meet the objectives of this alternative, if implemented. These projects were described in Section 2.3.3. and include two marsh creation projects (Large-Scale Marsh Creation and Lower Barataria Marsh Creation), four ridge restoration projects (Grand Bayou Ridge Restoration, Bayou Eau Noire Ridge Restoration, Adams Bay Ridge Restoration, and Red Pass Ridge Restoration), one combined ridge restoration and marsh creation project (Spanish Pass Increment of the Barataria Basin Ridge and Marsh Creation), and four breakwater construction projects (Lake Hermitage Shoreline Protection, East Snail Bay Shoreline Protection, West Snail Bay Shoreline Protection, and Bayou Perot Shoreline Protection).

All of these projects were included in the 2017 CMP. The Trustees may choose to move forward with future Phase II restoration plans that incorporate one or more of these projects. The Trustees may also identify additional similar restoration projects in the future that would correspond to this alternative.

3.2.2.2 OPA Evaluation

3.2.2.2.1 The Cost to Carry Out the Alternative

Because this alternative is a strategic alternative, the Trustees are unable to estimate a total cost at this point.[10] However, the total cost of the eleven project examples currently included in this alternative is $1,612,500,000. This includes $1,384,100,000 for marsh creation, $155,200,000 for ridge restoration, and $73,200,000 for shoreline protection projects.

3.2.2.2.2 The Extent to Which the Alternative is Expected to Meet the Goals and Objectives of Returning the Injured Natural Resources and Services to Baseline and/or Compensating for Interim Losses

Marsh creation projects through the placement of dredged materials can be implemented quickly, targeted to specific locations with currently degraded habitat, and have a track record of success within Louisiana. These projects directly compensate for injuries to wetland habitat resources and services in Barataria Basin, as well as providing habitat for other injured resources that benefit from these marsh habitats. CPRA (alone and in conjunction with other agency partners) has built more than 8,700 acres of marsh since 2007 through marsh creation projects, and currently has more than 14,800 benefit acres in engineering and design. All of the habitat restoration projects funded through the CWPPRA program, including marsh creation, undergo rigorous monitoring (see: https://www.lacoast.gov/), which allows the LA TIG to use lessons learned from previous projects to increase the likelihood of success.

[10] The Trustees do not anticipate using NRDA funding to implement all of the project examples discussed in this alternative.

Ridge restoration projects are intended to reestablish historical ridges through sediment placement and vegetative plantings. Although these projects provide minimal surge protection, they can provide some wave attenuation within the basin (Corbell et al., 2013). This type of habitat is regionally scarce, due to the erosion of historical ridges, so implementing ridge restoration helps reestablish the diversity of habitat types that comprise a healthy and functioning Barataria Basin ecosystem. Two ridge restoration projects have already been implemented in the Barataria Basin through the CWPPRA program, which allows the LA TIG to benefit from lessons learned.

The long-term sustainability of marsh creation projects is affected by the balance between forces acting against the marsh (e.g., subsidence, sea level rise, and marsh edge erosion) and the accretion of mineral and organic sediments that together maintain the marsh's elevation relative to the water level. Depending on the location within the Barataria Basin, marsh creation projects can be subject to high subsidence rates and high wave energy. Without continuous input of substantial amounts of sediment to counteract these processes, a large portion of the existing and created marshes in the Barataria Basin are projected to be lost over the coming decades as project sites succumb to sea level rise, subsidence, and other environmental factors.

Shoreline protection projects can help protect existing marsh (whether natural or restored) from marsh edge erosion and thereby extend the sustainability of the marsh. However, shoreline protection projects do not counteract impacts resulting from subsidence or sea level rise and do not provide any input of sediment to counteract erosive processes. Depending on the location of the shoreline protection, the marsh could over time even lose some sources of sediment replenishment.

Based on this analysis, Alternative 2 would restore a variety of interspersed and ecologically connected coastal habitats, because of the combination of marsh creation, ridge restoration, and shoreline protection that can protect existing or restored marsh habitat. Thus, this alternative would compensate for injuries to wetlands, coastal, and nearshore habitats and services in the Barataria Basin, where the greatest oiling injuries in Louisiana occurred, and also would compensate for injuries to estuarine-dependent resources in the Gulf of Mexico that depend on productive emergent wetland habitat in the Barataria Basin. Although this alternative would compensate for injuries, it only provides limited resiliency and sustainability for the restored habitats and the injured resources in the Gulf of Mexico ecosystem that depend on wetlands, coastal and nearshore habitat. The alternative fails to provide a long-term sustainable source of sediment, so its habitat benefits are limited only to those areas directly restored and to adjacent wetlands protected after construction. Further, this alternative does not provide enhanced function to the variety of habitats benefited by Alternative 1 through reestablishment of deltaic processes and also does not provide the far-afield benefits to the Gulf ecosystem provided by Alternative 1.

3.2.2.2.3 The Likelihood of Success of Each Alternative

Individually, each of the project types incorporated into this alternative have a high likelihood of success if engineered, sited, and constructed correctly, based on their track record of implementation in Louisiana. More than 120 marsh creation, ridge restoration, and shoreline protection projects have been completed across Louisiana by CPRA and through the CWPPRA

program, including 30 projects in Barataria Basin. Project-level monitoring indicates that these projects have successfully restored and protected habitat as intended. The LA TIG is also able to benefit from lessons learned from these projects. The combination of ridge restoration with marsh creation and shoreline protection is expected to increase the overall likelihood of success for this alternative. The expected diversity of habitats created will provide increased physical and biological resiliency to the system through increased habitat function, wave attenuation and creating refuges of higher land elevation for terrestrial biological resources. As noted in the PDARP/PEIS, "By identifying opportunities to restore multiple habitats within one project, or to implement multiple projects within a given area, the Trustees believe they may accelerate recovery of injured ecosystem functions and achieve a more integrated restoration of the nearshore ecosystem and its service flows." In addition, the wetland restoration envisioned for Barataria Basin in this alternative "can provide important nursery areas for the production of larval fishes and crustaceans, resulting in increased production of ecologically, recreationally, and commercially important species (Minello and Webb Jr., 1997; Peterson and Turner, 1994). Numerous marsh birds and wading birds also benefit from the invertebrate production stimulated by coastal wetland productivity (Greenberg et al., 2006)" (PDARP/PEIS, Section 5.5.2.2).

A comprehensive monitoring and adaptive management process for all of the restoration techniques is a critical element for maximizing ecosystem benefits, minimizing risk and addressing uncertainties. For example, if a shoreline protection or marsh creation project settles to a lower height than expected, future designs may need to be adapted to achieve project goals.

3.2.2.2.4 The 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

As summarized in Section 3.2.1.2.4, marsh creation projects in Barataria Basin can help prevent future injuries to marsh vegetation and soils, as well as estuarine-dependent resources, such as fish, crustaceans, and marsh birds. Ridge restoration and shoreline protection projects also help prevent future injury to estuarine-dependent resources through helping to increase the longevity of surrounding marsh. However, there is some potential for collateral injury from the implementation of marsh creation, ridge restoration, and shoreline protection techniques, including short-term and long-term, minor to moderate adverse impacts on the physical environment due to construction activities. These include impacts from the use of heavy equipment and barges, which can cause direct localized and short-term, moderate adverse impacts from sediment disturbance and compaction, increased turbidity, and noise as the materials are placed in the designed configuration. Long-term, minor adverse indirect impacts on the physical environment could occur from the placement of dredged material and breakwaters in shallow water areas, which may affect sediment dynamics. Placement of materials (such as dredged material or riprap) would result in long-term, but localized, adverse impacts to the existing substrate. These impacts are expected to be localized, primarily affecting the area immediately surrounding the projects.

Alternative 2 would provide some benefit for preventing future erosion injuries to a system that suffered increased erosion as a result of the DWH oil spill by restoring wetlands through marsh creation, ridge restoration, and shoreline protection.

3.2.2.2.5 The Extent to Which Each Alternative Benefits More than One Natural Resource and/or Service

Building and sustaining diverse wetland habitats in the Barataria Basin, including marshes and ridges, would benefit multiple resources because coastal wetlands provide a range of ecological functions and services, including providing important habitat for fish and wildlife species, improving water quality, stabilizing shorelines, reducing storm-surge risk, and capturing and storing carbon in organic soils (Armentano and Menges, 1986; Costanza et al., 2014; Moody and Aronson, 2007; Woodward and Wui, 2001; Zimmerman et al., 2000). Coastal wetlands provide important habitat for fish, benthic communities, birds, and terrestrial wildlife (Nagelkerken et al., 2008; Peterson and Turner, 1994; Robertson and Duke, 1987). They help stabilize substrates and reduce coastal erosion (Gedan et al., 2011). Wetland restoration provides important nursery areas for the production of larval fishes and crustaceans, resulting in increased production of ecologically, recreationally, and commercially important species (Minello and Webb Jr., 1997; Peterson and Turner, 1994). Numerous marsh birds and wading birds benefit from the invertebrate production stimulated by coastal wetland productivity (Greenberg et al., 2006). Another benefit of coastal wetland systems is their ability to mitigate storm risk, providing protection to nearby infrastructure and coastal communities, particularly during low-energy storm events (Costanza et al., 2014; Costanza et al., 2008). Improved wetlands would also provide ancillary benefits to human users through increased opportunities for recreational activities (Zedler and Leach, 1998).

The benefits provided to multiple natural resources and services would be limited in duration. Depending on the location within the Barataria Basin, marsh creation projects can be subject to high subsidence rates and high wave energy. Without continuous input of substantial amounts of sediment to counteract these processes, a large portion of the existing and created marshes in the Barataria Basin are projected to be lost over the coming decades as projects succumb to sea level rise, subsidence, and other environmental factors. Similarly, the benefits provided by ridge restoration and shoreline protection projects will also succumb to sea level rise, subsidence, and other environmental factors.

3.2.2.2.6 The Effect of Each Alternative on Public Health and Safety

Alternative 2 would have a small positive net effect on public health and safety compared to a natural recovery/no-action alternative because it would provide some natural storm protection for surrounding communities through creation of additional marsh and ridge habitat and through shoreline protection. No long-term impacts on public health and safety are anticipated from implementation of the restoration techniques in Alternative 2.

3.2.2.2.7 Approach to NEPA Environmental Effects Analysis

The PDARP/PEIS completed a programmatic analysis in order to capture the benefits and impacts from proposed restoration approaches, including approaches that encompass marsh creation and ridge restoration projects. Sections 1.0 and 3.1.7 provide an explanation for the LA TIG's approach to the NEPA analysis for the SRP/EA. A brief summary of the impacts associated with the restoration approach that encompasses marsh creation and ridge restoration projects is included in the PDARP/PEIS (Section 6.4.1). That discussion is incorporated by reference and summarized as follows:

- Short-term and long-term, minor to moderate adverse impacts on the physical environment could result from construction activities related to creating, restoring, and enhancing coastal wetlands.
- Short-term, minor to moderate adverse impacts to the biological environment could occur during construction activities.
- Some applications of this approach could also result in localized, permanent, adverse impacts to shallow intertidal or subtidal habitat—such as that for SAV or oysters, for instance, if fill is placed in these areas to create marsh.
- This approach would provide long-term benefits for many ecologically and economically important animals, including fish, shrimp, shellfish, birds, sea turtles, marine mammals, and terrestrial mammals in the form of food, shelter, breeding, and nursery habitat.
- Minor to moderate, localized adverse impacts to socioeconomic resources could be expected if a project includes protection of lands that otherwise would have been developed for residential housing or commercial uses. [Note that the technique of land protection is not currently proposed in this SRP]
- Implementation of this approach at national, state, and local parks; wildlife refuges; and wildlife management areas could result in short-term, minor adverse impacts to land and marine management due to temporary partial or full closure of areas.
- Creating, enhancing, or restoring coastal wetlands could result in minor (temporary disturbance) to moderate (disturbance without loss of cultural information) impacts on cultural and historic resources due to construction activities.

A brief discussion of the impacts from the restoration approach that encompasses shoreline protection projects, is included in the PDARP/PEIS (Section 6.4.1). That discussion is incorporated by reference and summarized as follows:

- Construction of hard structures such as groins, breakwaters, and living shorelines can involve the use of heavy equipment on the shoreline and/or barges that can cause direct, localized, and short-term adverse impacts to sediments (e.g., disturbance and compaction), water quality (e.g., increased turbidity), air quality (due to vehicle emissions), and ambient noise conditions as the materials are placed in the designed configuration.
- One concern with hard structures on beaches, if not properly designed, is that they can cause erosion of the downdrift shoreline and scour on the seaward end. Once in place, structures such as groins and breakwaters can change the natural process of sediment accretion and erosion, including preventing washover events on beaches and causing erosion in offsite locations. These adverse effects would be minor to moderate and long-term, because they could affect substrate and geologic characteristics of the adjacent shoreline and will extend beyond the construction period.

- Potential minor adverse effects of this approach could include disturbance to marine mammals, sea turtles, and birds in nearshore waters from increased vessel traffic.
- The footprint of hard structures such as groins, breakwaters, and living shorelines changes the habitat from a soft to a hard substrate, which changes the benthic community, often adding habitat complexity and attracting new species of attached organisms such as oysters and algae and the animals that feed on them, such as birds, fish, and sea turtles.
- Socioeconomic benefits would result from improved shoreline integrity and additional buffer and flood storage during storms.

A more-detailed discussion of the beneficial and adverse impacts of marsh creation/ridge restoration and shoreline protection alternatives can be found in the PDARP/PEIS Section 6.4.1. Additionally, an analysis of cumulative impacts that was incorporated into this analysis can be found at PDARP/PEIS Section 6.6. These Sections, as well as the analysis of other issues such as climate change discussed in Chapter 6 of the PDARP/PEIS are incorporated by reference. The LA TIG has determined that the discussion of potential environmental impacts in the PDARP/PEIS is a thorough analysis of the potential range of impacts from the alternatives considered here, and there is no significant new information relevant to environmental concerns or impacts.

3.2.3 Alternative 3: Marsh Creation and Ridge Restoration

3.2.3.1 Alternative Description

Alternative 3 includes only marsh creation and ridge restoration projects. Projects under this alternative pertain to the identified restoration technique "Create or enhance coastal wetlands through placement of dredged material." The goal of this alternative is to increase the function, extent, and sustainability of the highly productive habitats in the Barataria Basin through a complementary suite of restoration projects that interact to provide both short-term and long-term benefits to injured resources throughout the Gulf of Mexico.

The Trustees have identified a series of example projects that would meet the objectives of this alternative, if implemented. These projects were described in Section 2.3.3. and include two marsh creation projects (Large-Scale Marsh Creation and Lower Barataria Marsh Creation), four ridge restoration projects (Grand Bayou Ridge Restoration, Bayou Eau Noire Ridge Restoration, Adams Bay Ridge Restoration, and Red Pass Ridge Restoration), and one combined ridge restoration and marsh creation project (Spanish Pass Increment of the Barataria Basin Ridge and Marsh Creation).

3.2.3.2 OPA Evaluation

3.2.3.2.1 The Cost to Carry out the Alternative

Because this alternative is a strategic alternative, the Trustees are unable to estimate a total cost at this point.[11] However, the total cost of the seven project examples currently included in this alternative is $1,539,300,000. This includes $1,384,100,000 for marsh creation and $155,200,000 for ridge restoration projects.

3.2.3.2.2 The Extent to Which Each Alternative is Expected to Meet the Goals and Objectives of Returning the Injured Natural Resources and Services to Baseline and/or Compensating for Interim Losses

Marsh creation projects through the placement of dredged materials can be implemented quickly, targeted to specific locations with currently degraded habitat, and have a track record of success within Louisiana. These projects directly compensate for injuries to wetland habitat resources and services in Barataria Basin, as well as providing habitat for other injured resources that benefit from these marsh habitats. CPRA (alone and in conjunction with other agency partners) has built more than 8,700 acres of marsh since 2007 through marsh creation projects, and currently s more than 14,800 benefit acres in engineering and design. All of the habitat restoration projects funded through the CWPPRA program, including marsh creation, undergo rigorous monitoring (see: https://www.lacoast.gov/), which allows the TIG to use lessons learned from previous projects to increase the likelihood of success.

Ridge restoration projects are intended to reestablish historical ridges through sediment placement and vegetative plantings. Although these projects provide minimal surge protection, they can provide some wave attenuation within the basin (Corbell et al., 2013). This type of habitat is regionally scarce, due to the erosion of historical ridges, so implementing ridge restoration helps reestablish the diversity of habitat types that comprise a healthy and functioning Barataria Basin ecosystem. The CWPPRA program has already implemented two ridge restoration projects in the Barataria Basin which allows the TIG to benefit from lessons learned.

The long-term sustainability of marsh creation projects is affected by the balance between forces acting against the marsh (e.g., subsidence, sea level rise, and marsh edge erosion) and the accretion of mineral and organic sediments that together maintain the marsh's elevation relative to the water level. Depending on the location within the Barataria Basin, marsh creation projects can be subject to high subsidence rates and high wave energy. Without continuous input of substantial amounts of sediment to counteract these processes, a large portion of the existing and created marshes in the Barataria Basin are projected to be lost over the coming decades as project sites succumb to sea level rise, subsidence, and other environmental factors.

[11] The Trustees do not anticipate using NRDA funding to implement all of the project examples discussed in this alternative.

Alternative 3 only provides limited resiliency and sustainability for restoring wetlands, coastal and nearshore habitats because the alternative fails to provide a long-term sustainable source of sediment or protection from shoreline erosion.

3.2.3.2.3 The Likelihood of Success of Each Alternative

Individually, each of the project types incorporated into this alternative have a high likelihood of success if engineered, sited, and constructed correctly, based on their track record of implementation in Louisiana. More than 70 marsh creation and ridge restoration projects have been implemented across Louisiana by CPRA and through the CWPPRA program, including 22 projects in Barataria Basin. Project-level monitoring indicates that these projects have successfully restored and protected habitat as intended. The LA TIG is also able to benefit from lessons learned from these projects.

The combination of ridge restoration with marsh creation is expected to increase the overall likelihood of success for this alternative, because the marsh creation and ridge restoration components can build habitat quickly. The expected diversity of habitats created will provide increased physical and biological resiliency to the system, through wave attenuation and creating refuges of higher land elevation for terrestrial biological resources. As noted in the PDARP/PEIS, "By identifying opportunities to restore multiple habitats within one project, or to implement multiple projects within a given area, the Trustees believe they may accelerate recovery of injured ecosystem functions and achieve a more integrated restoration of the nearshore ecosystem and its service flows." In addition, the wetland restoration envisioned for Barataria Basin in this alternative "can provide important nursery areas for the production of larval fishes and crustaceans, resulting in increased production of ecologically, recreationally, and commercially important species (Minello and Webb Jr., 1997; Peterson and Turner, 1994). Numerous marsh birds and wading birds also benefit from the invertebrate production stimulated by coastal wetland productivity (Greenberg et al., 2006)" (PDARP/PEIS, Section 5.5.2.2).

A comprehensive monitoring and adaptive management process for all of the restoration techniques is a critical element for maximizing ecosystem benefits, minimizing risk, and addressing uncertainties. For example, if a marsh creation project settles to a lower height than expected, the design may need to be adapted to still achieve project goals.

3.2.3.2.4 The 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

Alternative 3 would provide some benefit for preventing future erosion injuries to marsh vegetation and soils in a system that suffered increased erosion as a result of the DWH oil spill by restoring wetlands through marsh creation and ridge restoration. Restoration of marsh habitat also helps prevent future injury to estuarine-dependent resources, such as fish, crustaceans, and marsh birds, that lost supporting habitat through the oil spill and through subsequent increased erosion. Ridge restoration projects also help prevent future injury to estuarine-dependent resources through helping to increase the longevity of surrounding marsh. Overall, this alternative would help prevent future injury to impacted resources by providing long-term benefits for many ecologically and economically important animals, including fish, shrimp, shellfish, birds, and marine mammals, in the form of food, shelter, breeding, and nursery habitat.

There is some potential for collateral injury from the implementation of the restoration techniques in this alternative. As noted in the PDARP/PEIS, "short-term and long-term, minor to moderate adverse impacts on the physical environment could result from construction activities related to creating, restoring, and enhancing coastal wetland. Long-term, minor adverse indirect impacts on the physical environment could occur from the placement of dredged material in shallow water areas, which may affect sediment dynamics. Placement of materials (such as dredged material or riprap) would result in long-term, but localized, adverse impacts to the existing substrate" (PDARP/PEIS, Section 6.4.1.1.1).

In addition, as noted in the PDARP/PEIS, "short-term, minor to moderate adverse impacts to the biological environment could occur during construction activities related to: 1) disturbance to wetland vegetation during construction; and 2) displacement of land-based or aquatic faunal species resulting from staging equipment and materials, as well as entrapment of marine mammals. Some applications of this approach could also result in localized, permanent, adverse impacts to shallow intertidal or subtidal habitat—such as that for SAV or oysters, for instance, if fill is placed in these areas to create marsh. These impacts are expected to be confined to the immediate vicinity of the project, and best practices would likely be implemented to minimize adverse impacts" (PDARP/PEIS, Section 6.4.1.1.2).

3.2.3.2.5 The Extent to Which Each Alternative Benefits More than One Natural Resource and/or Service

Building and sustaining diverse wetland habitats in the Barataria Basin, including marshes and ridges, would benefit multiple resources because coastal wetlands provide a range of ecological functions and services, including providing important habitat for fish and wildlife species, improving water quality, stabilizing shorelines, reducing storm-surge risk, and capturing and storing carbon in organic soils (Armentano and Menges, 1986; Costanza et al., 2014; Moody and Aronson, 2007; Woodward and Wui, 2001; Zimmerman et al., 2000). Coastal wetlands provide important habitat for fish, benthic communities, birds, and terrestrial wildlife (Nagelkerken et al., 2008; Peterson and Turner, 1994; Robertson and Duke, 1987). They help stabilize substrates and reduce coastal erosion (Gedan et al., 2011). Wetland restoration provides important nursery areas for the production of larval fishes and crustaceans, resulting in increased production of ecologically, recreationally, and commercially important species (Minello and Webb Jr., 1997; Peterson and Turner, 1994). Numerous marsh birds and wading birds benefit from the invertebrate production stimulated by coastal wetland productivity (Greenberg et al. 2006). Another benefit of coastal wetland systems is their ability to mitigate storm risk, providing protection to nearby infrastructure and coastal communities, particularly during low-energy storm events (Costanza et al., 2014; Costanza et al., 2008). Improved wetlands would also provide ancillary benefits to human users through increased opportunities for recreational activities (Zedler and Leach, 1998).

The benefits provided to multiple natural resources and services would be limited in duration. Depending on the location within the Barataria Basin, marsh creation projects can be subject to high subsidence rates and high wave energy. Without continuous input of substantial amounts of sediment to counteract these processes, a large portion of the existing and created marshes in the Barataria Basin are projected to be lost over the coming decades as project benefits succumb to sea level rise, subsidence, and other environmental factors. Similarly, the benefits provided by

ridge restoration projects will also succumb to sea level rise, subsidence, and other environmental factors.

3.2.3.2.6 The Effect of Each Alternative on Public Health and Safety

Alternative 3 would have a small positive net effect on public health and safety compared to a natural recovery/no-action alternative because it would provide some natural storm protection for surrounding communities through creation of additional marsh and ridge habitat. No long-term impacts on public health and safety are anticipated from implementation of the restoration techniques in Alternative 3.

3.2.3.2.7 Approach to NEPA Environmental Effects Analysis

The PDARP/PEIS completed a programmatic analysis in order to capture the benefits and impacts from proposed restoration approaches, including approaches that encompass marsh creation and ridge restoration projects. Sections 1.0 and 3.1.7 provide an explanation for the LA TIG's approach to the NEPA analysis for the SRP. A brief discussion of the impacts from marsh creation/ridge restoration projects is included in the PDARP/PEIS (Section 6.4.1). Those discussions are incorporated by reference and summarized as follows:

- Short-term and long-term, minor to moderate adverse impacts on the physical environment could result from construction activities related to creating, restoring, and enhancing coastal wetlands.
- Short-term, minor to moderate adverse impacts to the biological environment could occur during construction activities.
- Some applications of this approach could also result in localized, permanent, adverse impacts to shallow intertidal or subtidal habitat—such as that for SAV or oysters, for instance, if fill is placed in these areas to create marsh.
- This approach would provide long-term benefits for many ecologically and economically important animals, including fish, shrimp, shellfish, birds, sea turtles, marine mammals, and terrestrial mammals in the form of food, shelter, breeding, and nursery habitat.
- Minor to moderate, localized adverse impacts to socioeconomic resources could be expected if a project includes protection of lands that otherwise would have been developed for residential housing or commercial uses.
- Implementation of this approach at national, state, and local parks; wildlife refuges; and wildlife management areas could result in short-term, minor adverse impacts to land and marine management due to temporary partial or full closure of areas.
- Creating, enhancing, or restoring coastal wetlands could result in minor (temporary disturbance) to moderate (disturbance without loss of cultural information) impacts on cultural and historic resources due to construction activities.

A more-detailed discussion of the beneficial and adverse impacts of marsh creation/ridge restoration alternatives can be found in the PDARP/PEIS Section 6.4.1. Additionally, an analysis of cumulative impacts that was incorporated into this analysis can be found at PDARP/PEIS Section

6.6. These Sections, as well as the analysis of other issues such as climate change discussed in Chapter 6 of the PDARP/PEIS are incorporated by reference. The LA TIG has determined that the discussion of potential environmental impacts in the PDARP/PEIS is a thorough analysis of the potential range of impacts from the alternatives considered here, and there is no significant new information relevant to environmental concerns or impacts.

3.2.4 Alternative 4: Natural Recovery/No-Action

3.2.4.1 Alternative Description

As discussed in Section 1.7, given that the DWH Trustees rejected a natural recovery alternative in the PDARP/PEIS, the LA TIG is not required to carry forward a natural recovery alternative for purposes of OPA analysis in this SRP/EA, but are required to carry forward a No-Action Alternative under NEPA. In addition, the success of restoration undertaken in the Barataria Basin will be evaluated against this natural recovery alternative.[12]

3.2.4.2 OPA Evaluation

3.2.4.2.1 The Cost to Carry out the Alternative

Because this alternative does not include any action on the part of the Trustees, there is no additional cost to carry out this alternative.

3.2.4.2.2 The Extent to Which Each Alternative is Expected to Meet the Goals and Objectives of Returning the Injured Natural Resources and Services to Baseline and/or Compensating for Interim Losses

For the purposes of understanding a natural recovery/No-Action Alternative within this SRP/EA, the Trustees utilized modeling results originally conducted as part of the 2017 CMP process. To estimate FWOA conditions, the CMP used models that project changes in habitat area, hydrology, and salinity – these modeled outputs are then used as inputs to biological models that project how these projected changes in physical conditions would affect vegetation, habitat for key species, and ecosystem outcomes.

The CMP utilized three different scenarios to represent a range of possible future conditions reflecting variable environmental drivers: "low," "medium," and "high," which can be broadly characterized by different rates of relative sea level rise. It is important to note that no one can predict with absolute certainty how relative sea level rise and related environmental drivers may change in the future. Therefore, the scenarios and FWOA analyses are meant to provide a

[12] For this SRP, no action means strategic restoration planning for the Barataria Basin is not finalized or implemented at this time. However, while that means the preferred strategic alternative will not currently be implemented, the LA TIG anticipates that it may undertake further strategic or project-specific restoration planning within the Barataria Basin in the future. Rejection of the preferred alternative would not mean that future TIG-funded restoration projects are not pursued in the Barataria Basin; however, no such projects are currently predictable.

comparative baseline for assessing how the ecosystem could change over time, and assess the relative benefits of potential future projects across a range of different environmental futures.

Based on the analysis in the CMP, under the FWOA the lower Barataria Basin would lose approximately 60-80% of its marsh habitat compared to current conditions by year 50. There is a complete loss of freshwater habitat regardless of scenario by year 50, and under the "high" scenario that loss occurs in the first 20 years. There is also a near total loss of brackish and intermediate marsh in the "high" scenario by year 50, though brackish marsh does remain in the "low" and "medium" scenarios (Figure 17).

Although these scenarios are illustrative for this SRP/EA, note that the FWOA for the CMP is not fully equivalent to the no-action scenario for this SRP/EA. While the No-Action scenario for this SRP/EA involves no strategic restoration planning for the Barataria Basin at this time, the LA TIG may undertake further strategic or project-specific restoration planning in the future. The State of Louisiana also could continue to carry out other types of restoration in Barataria Basin or seek other funding sources for wetlands, coastal, and nearshore habitat restoration.

3.2.4.2.3 The Likelihood of Success of Each Alternative

As summarized above, the No-Action Alternative does not have a high likelihood of success, because available modeling indicates that this alternative fails to maintain wetlands, coastal and nearshore habitats over time.

3.2.4.2.4 The 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

Because the No-Action alternative does not include any construction or restoration, this alternative is not expected to have any net effect on preventing future injury, or on causing collateral injury. The projected impacts of increased flooding risk and land loss under a No-Action Alternative would occur without mitigation from NRDA funded restoration.

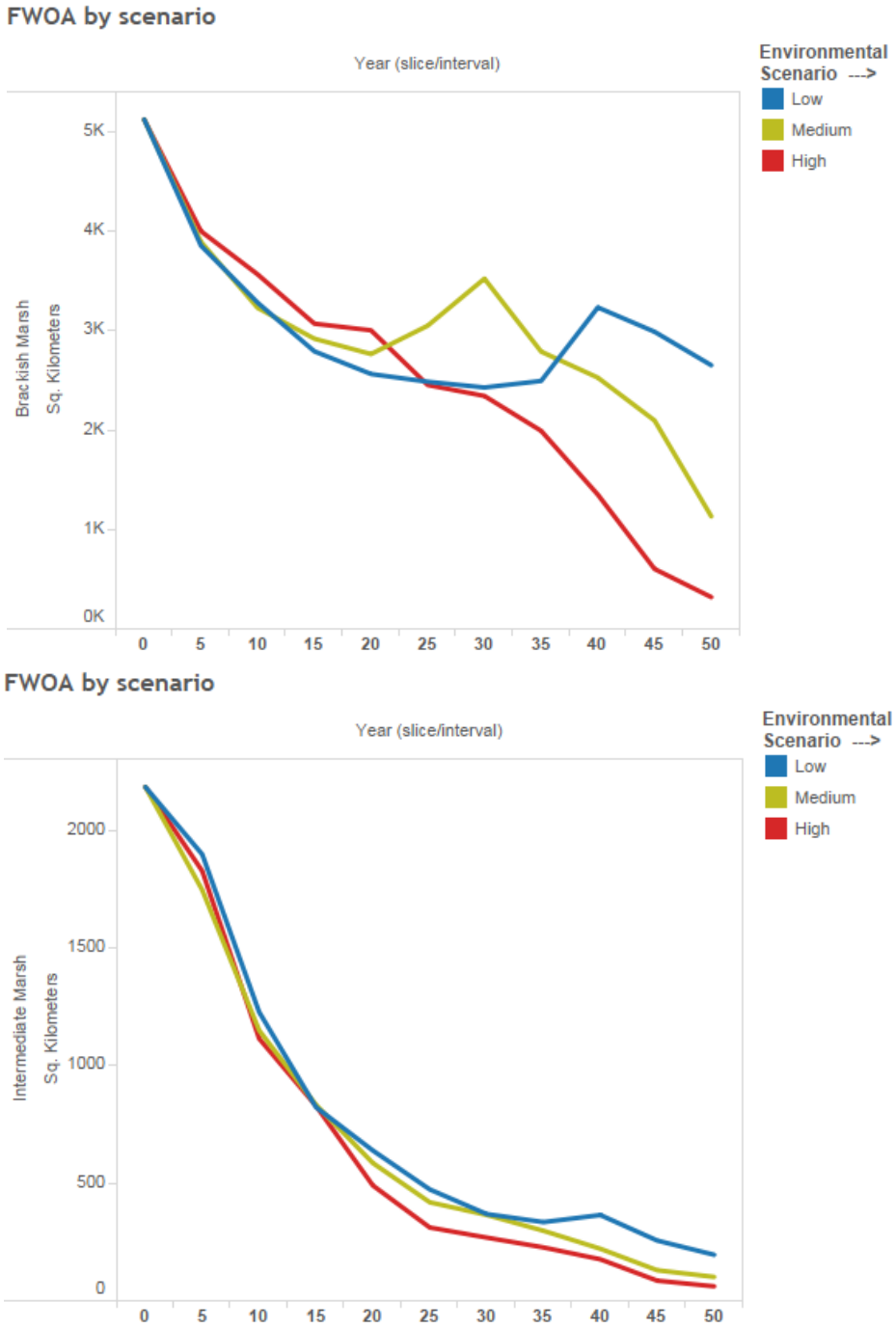

Figure 17. Change in the projected area of brackish and intermediate marsh over time in lower Barataria Basin, under three different Future Without Action Coastal Master Plan scenarios. (Blue is low scenario, Yellow is medium scenario and Red is high scenario)

3.2.4.2.5 The Extent to Which Each Alternative Benefits More than One Natural Resource and/or Service

The 2017 CMP utilized Habitat Suitability Indices (HSIs) to understand how habitat quality and quantity for selected species would be projected to change over time under the three FWOA scenarios (Table 5). In general, compared to current conditions, the models project a marked decrease in habitat suitability for species that rely on marsh for part of their life history, while the models project increasing habitat suitability for other species such as oysters and adult spotted seatrout. Modeled habitat for blue crabs and juvenile Gulf menhaden decreased approximately 40%, and modeled habitat for small juvenile brown shrimp and juvenile spotted seatrout decreased approximately 30%, in the "high" scenario. Green-winged teal habitat decreases by more than 60% compared to current conditions, under the modeled "high" scenario.

Table 5
Percent change in habitat for selected species, between year 50 and current conditions, based on HSI modeling for the CMP

	Low	Medium	High
Blue Crab	-27.1	-37.5	-43.2
Small Juvenile Brown Shrimp	-5.2	-20.4	-33.7
Juvenile White Shrimp	-3.2	-8.5	-12.2
Juvenile Spotted Seatrout	-9.3	-19.1	-34.7
Adult Spotted Seatrout	+12.2	+14.0	+13.5
Juvenile Gulf Menhaden	-25.1	-35.2	-40.8
Oyster Habitat	+20.7	+15.1	+5.8
Green-winged Teal	-24.4	-49.1	-67.0

This alternative would have no beneficial impacts to habitats because this alternative would largely result in a continuation of the conditions described in the Final PDARP/PEIS Chapters 3, Ecosystem Setting and 4, Injury to Natural Resources, and there would be no associated benefits to Wetlands, Coastal, and Nearshore Habitat. Even if funding and construction of other DWH projects, such as those funded by the RESTORE Act, does occur in the restoration areas, the full suite of habitat restoration benefits would not be realized due to diminished funding and the lost opportunity for leveraged funding. The Natural Recovery alternative does not meet the LA TIG's goals and objectives and does not provide the restoration benefit to habitat that would occur through the proposed alternatives.

3.2.4.2.6 The Effect of Each Alternative on Public Health and Safety

Alternative 4 does not have a positive effect on public health and safety because it fails to maintain coastal and nearshore marshes that currently serve as storm protection for Louisiana residents further inland. Figure 18 show the projected land loss (red) in Barataria Basin by year 50 under the high FWOA scenario for the CMP. (Again, this figure is illustrative and not identical to the Trustee No-Action scenario).

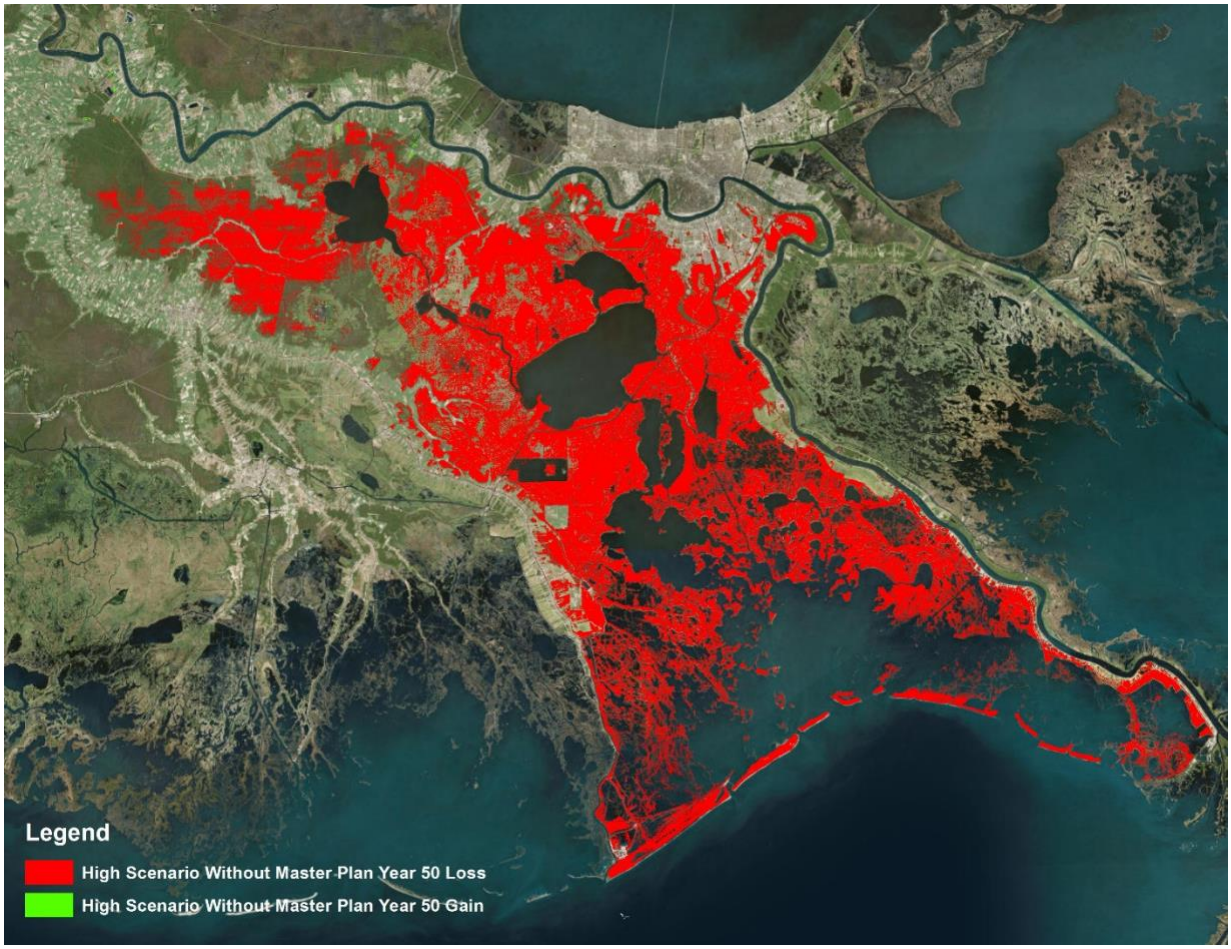

Figure 18. Land loss/land gain in Barataria Basin. (Red is loss, green is gain.)

3.2.4.2.7 Approach to NEPA Environmental Effects Analysis

The PDARP/PEIS completed a programmatic analysis in order to capture the benefits and impacts from the No-Action Alternative. A brief summary of these impacts, as summarized in the PDARP/PEIS (Section 6.5.1), is as follows:

- This alternative would have no beneficial impacts to elements of the environment, as natural resources would recover more slowly or not recover without restoration. Under this alternative, resources affected by the spill would remain injured for a longer period of time.
- Each of the restoration techniques identified above have the potential to contribute to some short or long term adverse impacts to physical resources, biological resources, or socioeconomics. Under the No-Action Alternative, these impacts would not occur.

Given that technically feasible restoration approaches are available to compensate for interim natural resource and service losses, this alternative was rejected from further OPA evaluation within the Final PDARP/PEIS. Based on this determination, tiering this SRP/EA from the Final

PDARP/PEIS, and incorporating that analysis by reference, the LA TIG did not evaluate natural recovery as a viable alternative under OPA. Natural recovery is not considered further in this document. NEPA requires a No-Action Alternative, and thus the natural recovery/No-Action Alternative scenarios will be analyzed in subsequent Phase II NEPA documentation.

3.3 Comparison of the Alternatives and OPA AND NEPA Evaluation Conclusion

3.3.1 Comparison of Alternatives

The LA TIG completed the OPA and NEPA evaluation of the reasonable range of alternatives:

- Marsh creation and ridge restoration plus large-scale sediment diversion.
- Marsh creation and ridge restoration plus shoreline protection.
- Marsh creation and ridge restoration.
- Natural recovery/No Action.

The comparative benefits for habitat gained over 50 years from the three types of projects included in this SRP/EA (marsh creation and ridge restoration plus large-scale sediment diversion) are illustrated by three example graphics from the CMP (Figures 19–21). Each figure shows land-area change for an example project from each project type, comparing the total land if the project is implemented (in red) versus the projected total land under a FWOA "high environmental scenario" (in black). In addition to the three figures shown below, Table 6 summarizes the comparison of alternatives under OPA and NEPA.

3.3.2 Summary of Conclusions in the SRP/EA

The PDARP/PEIS places significant emphasis on restoration of Louisiana's coastal marshes to restore for damages caused by the DWH oil spill. Although the three action alternatives all incorporate restoration approaches and techniques included in the PDARP/PEIS, Alternative 1 best meets the goals for this restoration type described in the PDARP/PEIS. The OPA analysis indicated that Alternative 1 (marsh creation and ridge restoration plus large-scale sediment diversion) would provide the greatest level of benefits to injured Wetlands, Coastal, and Nearshore habitats and to the large suite of injured resources that depend in their lifecycle on productive and sustainable wetland habitats. Alternative 1 meets the LA TIG goals and objectives, has a high likelihood of success, and would reduce some sources of future injury (particularly erosion).

Table 6
Comparison of Action Alternatives Under OPA and NEPA

	Cost of project examples currently included in alternative[1]	**Acres at Year 50**	**Cost-Effective**	**Meets Trustee Restoration Goals & Objectives**	**High Likelihood of Success**	**Prevent Future Injury & Avoid Collateral Injury**	**Benefits Multiple Resources**	**Public Health & Safety**	**Additional Considerations for NEPA Analysis**
Alternative 1: Marsh Creation and Ridge Restoration Plus Large-scale Sediment Diversions	**$3,821,600,000**	129,270	Most cost-effective because of greater habitat acreage benefited for longer duration	Best meets Trustees' restoration goals and objectives because of increased sustainability	Highest likelihood of success because of increased sustainability and long-term benefits to injured resources	Prevents future erosion injuries to the greatest extent; has potential for collateral injury associated with changes in salinity	Greatest duration of benefit to multiple resources because of sustainability of habitat	Overall positive net effect on public health and safety by providing natural storm protection for surrounding communities. Localized impacts to public health and safety possible in immediate vicinity of diversions.	Short-term and long-term, minor to major[2] impacts on physical environment, biological environment and socioeconomic resources. Long-term benefits for ecologically important animals. See PDARP/PEIS Section 6.4.1

	Cost of project examples currently included in alternative[1]	Acres at Year 50	Cost-Effective	Meets Trustee Restoration Goals & Objectives	High Likelihood of Success	Prevent Future Injury & Avoid Collateral Injury	Benefits Multiple Resources	Public Health & Safety	Additional Considerations for NEPA Analysis
Alternative 2: Marsh Creation and Ridge Restoration plus Shoreline Protection	**$1,612,500,000**	23,470	Less cost-effective than Alt. 1 because of fewer acres benefited and decreased longevity	Meets goals and objectives to a lesser extent than Alt. 1 because of fewer acres benefited and decreased longevity	Lower likelihood of long-term success than Alt. 1 because of decreased longevity	Prevents future erosion injury to a lower extent than Alt. 1; has less potential for collateral injury compared to Alt. 1	Duration and extent of benefits to multiple resources lower than Alt. 1	Lesser degree of benefits and impacts to public health and safety compared to Alt. 1.	Short-term and long-term, minor to moderate impacts on physical environment, biological environment and socioeconomic resources. Long-term benefits for ecologically important animals. See PDARP/PEIS Section 6.4.1
Alternative 3: Marsh Creation and Ridge Restoration	**$1,539,300,000**	22,970	Less cost-effective than Alts. 1 and 2 because of decreased longevity	Meets goals and objectives to a lesser extent than Alts. 1 and 2 because of fewer acres benefited and decreased longevity	Lower likelihood of long-term success than Alts. 1 and 2 because of decreased longevity	Least potential for preventing future erosion injury; least potential for collateral injury	Duration and extent of benefits to multiple resources lower than Alts. 1 and 2	Lowest degree of benefits and impacts to public health and safety compared to Alts. 1 and 2.	Short-term and long-term, minor to moderate impacts on physical environment, biological environment and socioeconomic resources. Long-term benefits for ecologically important animals. See PDARP/PEIS Section 6.4.1

	Cost of project examples currently included in alternative[1]	Acres at Year 50	Cost-Effective	Meets Trustee Restoration Goals & Objectives	High Likelihood of Success	Prevent Future Injury & Avoid Collateral Injury	Benefits Multiple Resources	Public Health & Safety	Additional Considerations for NEPA Analysis
Alternative 4: Natural Recovery/No-Action	**$0**	Loss of approximately 60-80% of marsh habitat compared to current condition	Does not incur additional spending costs in the short-term. Long term less cost effective due to increased flooding risk and land loss	Does not meet goals and objectives of restoration.	Does not have a high likelihood of success	Not expected to have any net effect on preventing future injury, or on causing collateral injury	No beneficial impacts to marsh habitats; however, would benefit some open water species	Does not have a positive effect on public health and safety	No beneficial impacts to elements of the environment. Natural resources would recover more slowly or not recover without restoration. Resources affected by the spill would remain injured for a longer period of time

1. The Trustees do not anticipate that they will implement, with NRDA funding, all projects currently included in this alternative.

2. In the Draft SRP/EA, this table noted the range of effects from the PDARP/PEIS as “minor to moderate” instead of “minor to major.” This has been corrected for the Final SRP/EA. The characterization of “minor to major” for Alternative 1 was correct throughout the Draft SRP/EA except this table cell.

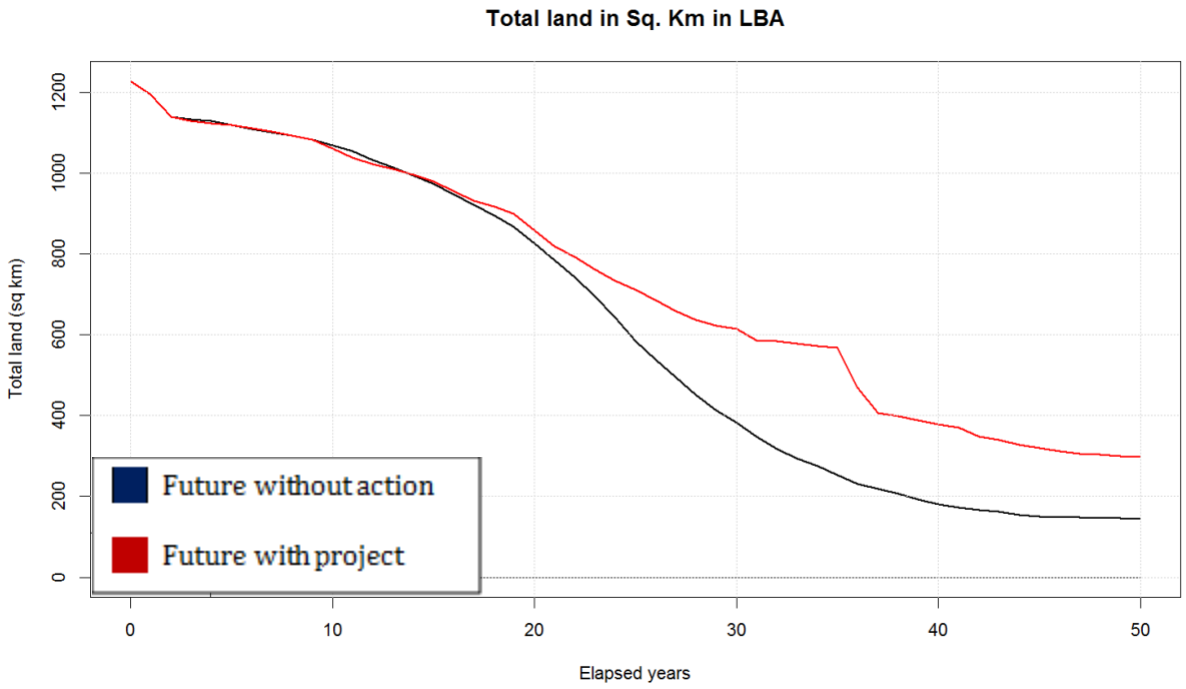

Figure 19. Lower Barataria Ecoregion Land Change Area with Mid-Barataria Sediment Diversion (High Scenario)

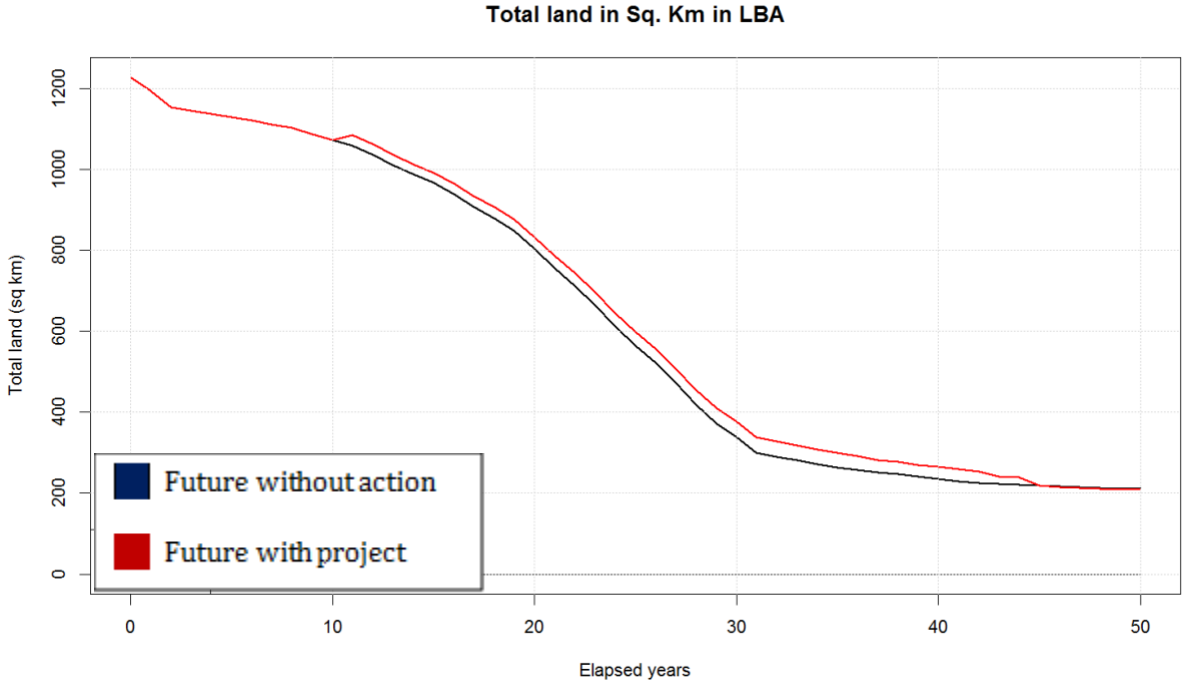

Figure 20. Lower Barataria Ecoregion Land Change Area with Large-Scale Barataria Marsh Creation – Component E (High Scenario)

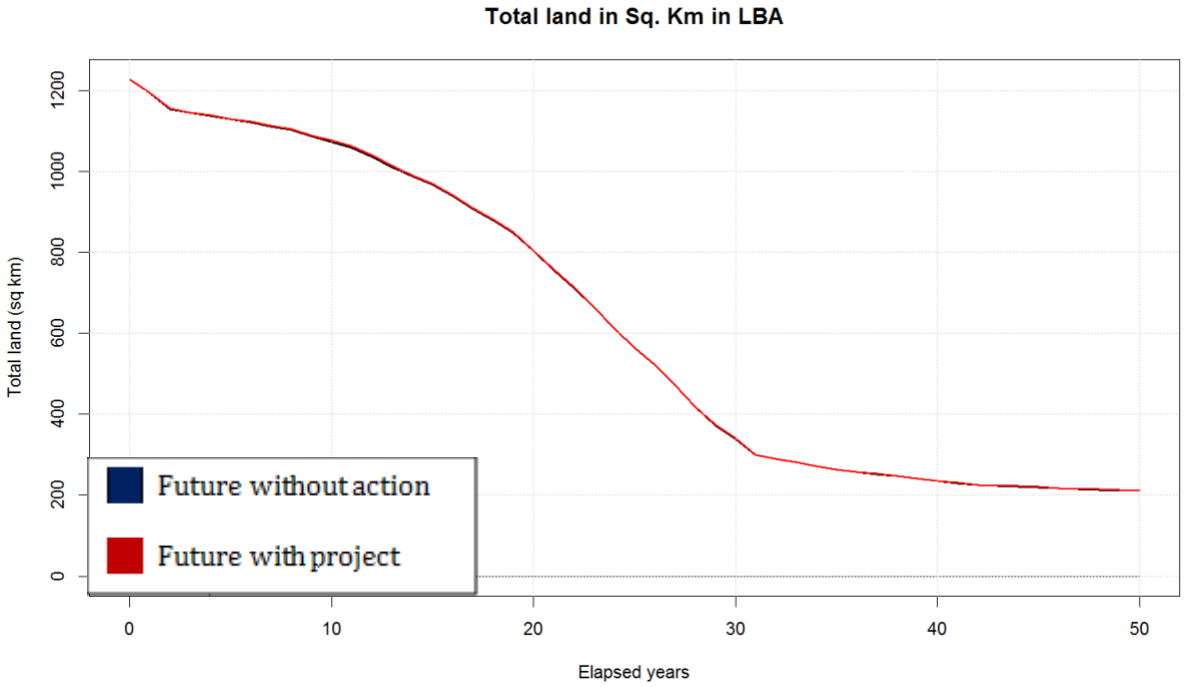

Figure 21. Lower Barataria Ecoregion Land Change Area with Grand Bayou Ridge Restoration

As acknowledged in the PDARP/PEIS analysis under NEPA, the selected alternatives and restoration techniques have the potential to cause adverse environmental impacts. However, over the long term, restoration of the Mississippi-Atchafalaya River processes would be expected to result in overall environmental benefits anticipated as a result of increased resilience of habitat for numerous species resulting from the preservation and restoration of coastal wetlands, see PDARP/PEIS 6.4.1.2. Where impacts fall within in this range is dependent on the location, operation and design. After considering the potential for a range of possible adverse impacts disclosed in the PDARP/PEIS and SRP/EA, the LA TIG has determined that Alternative 1 has the greatest potential to provide long-term ecosystem-level benefits and restoration of injured resources.

Given this analysis, the LA TIG selects Alternative 1 (marsh creation and ridge restoration plus large-scale sediment diversion) as the preferred strategic alternative for wetlands, coastal, and nearshore habitat restoration in the Barataria Basin. In arriving at this decision, the LA TIG evaluated the cost, expected benefits of restoring for wetlands, coastal, and nearshore habitats injured by the DWH oil spill and the injured resources that depend on these habitats, the likelihood of success, the ability to prevent future erosion injuries and habitat loss in coastal Louisiana as evaluated in the CMP, and potential environmental consequences as explained in the PDARP/PEIS. Given the large-scale injuries caused by the DWH oil spill, emphasis was placed on ecosystem-level benefits.

The Trustees have concluded that other restoration techniques, such as large marsh creation projects or multiple small-scale sediment diversions, cannot by themselves deliver the same

benefits or perform the same functions as an alternative that includes a large-scale sediment diversion.

The LA TIG acknowledges that the large-scale sediment diversions included in Alternative 1 have a relatively high cost of construction compared to other types of restoration projects. However, in comparing costs to benefits, large-scale sediment diversions are anticipated to be more cost effective than other ecosystem level restoration projects, including marsh creation. First, the marsh creation benefits realized by a large-scale sediment diversion have more longevity and are more sustainable over time. Additionally, the cost of a large-scale sediment diversion compared to a standalone marsh creation project is lower on a per acre basis because sediment entrained by a diversion does not require mechanical transport. As such, the costs for Alternative 1 are considered reasonable and appropriate, and comparable to other equivalent restoration projects – especially when viewed in light of the relative amount of wetland habitat that can be restored or maintained. Lastly, the other alternatives do not provide the full suite of ecosystem benefits provided by a diversion's reestablishment of deltaic processes such as the magnitude of enhancement of primary and secondary productivity and enhanced nutrient cycling. The Trustees acknowledge that there may be collateral injury or adverse impacts to other natural resources associated with this alternative. These impacts would be thoroughly analyzed as part of any Phase II restoration plan.

4.0 Identification of Preferred Alternative and Projects Advanced for Future Restoration Planning and Environmental Review

As described above, the LA TIG selects Alternative 1 (marsh creation and ridge restoration plus large-scale sediment diversion) as the preferred strategic alternative for wetlands, coastal, and nearshore habitat restoration in the Barataria Basin. Based on the historic loss of marsh habitat in the Barataria Basin, which was demonstrably accelerated and exacerbated by impacts from the DWH oil spill, the LA TIG has identified an immediate and urgent need to continue to carry forward projects for further restoration planning and environmental analysis that will address coastal habitat loss to provide for a more sustainable coast, and that will provide ecosystem-scale benefits to offset ecosystem-scale losses from the spill. Given the selection of Alternative 1 as the preferred alternative, the LA TIG proposes that immediately selecting for further restoration planning a project that involves marsh creation and a large-scale sediment diversion project in the Barataria Basin will best meet these combined needs. The LA TIG also confirms its 2017 decision to move the Spanish Pass Increment of the Barataria Basin Ridge and Marsh Creation project forward for further evaluation and planning.

Of the projects carried forward from the screening evaluation described in Section 2, the LA TIG selects the MBSD and one marsh creation increment within Large Scale Marsh Creation - Component E in the Barataria Basin as the projects to immediately carry forward into Phase II restoration plans and NEPA analyses. These particular projects were selected to be carried forward now on the basis of the following:

- The location of the projects in northern Barataria Basin, which places them in close proximity to some of the most heavily oiled portions of the Louisiana coastline.
- The cost efficiency of undertaking Large Scale Marsh Creation – Component E using a nearby Mississippi River borrow source prior to MBSD construction. If the Mississippi River borrow source were dredged for marsh creation after the MBSD was in operation, there would be a decrease in the effectiveness of sediment capture by the MBSD, resulting in a lower cost-effectiveness for the MBSD project.
- The proximity of the two projects to each other, which will maximize the synergistic benefits of the two projects, because the marsh creation increment will be able to capture additional sediment from the MBSD. In contrast, the Ama Sediment Diversion is located in the upper portion of the Barataria Basin and is not shown to synergistically benefit the marsh creation projects considered in this plan.
- The likelihood of success based on the adequacy and availability of information for the two projects. For example, the MBSD project has been studied in different iterations of the 2012 and 2017 CMP, and multiple other studies including in the Louisiana Coastal Area Hydrodynamic and Delta Management Study. It also has undergone project-specific engineering and design at CPRA.

- Funding availability, which limits the amount of restoration that can be initiated by the LA TIG. For example, simultaneously funding both large-scale sediment diversions at this time would limit other restoration opportunities.

As shown in Figure 22, CPRA's 2017 CMP has prioritized one of the marsh creation project increments within "Large Scale Marsh Creation – Component E." This project area is near the location of the proposed MBSD sediment diversion. The Mississippi River borrow areas that have been identified by CPRA to build this increment are the Alliance Anchorage and Willis Point Anchorage borrow areas. Both of these borrow areas could be utilized prior to the development of a MBSD structure. Assuming the marsh creation project can be authorized and constructed in advance of a MBSD structure, the borrow areas could be largely replenished and able to supply sediment to a MBSD project. For example, Yuill et al. (2016) observed the morphological evolution of a large (1.46 million m^3) submerged borrow pit on a lateral sandbar in the lower Mississippi River over a 2.5-year period and found 53% infilling of the initial pit volume. They also used the Delft 3D hydrodynamic model to simulate flow and sediment transport and were able to model borrow-pit evolution over time. This study demonstrates that sediment could be available when that project begins operation several years after the marsh creation project is constructed.

Projects selected to carry forward into Phase II restoration plans and NEPA analyses are listed below in Table 7.

Table 7
Projects Selected to Carry Forward into Phase II Restoration Plans

Project	Proposed Funding for Phase II Restoration Planning
Mid Barataria Sediment Diversion	$1,300,000,000[1]
One marsh creation increment within Large Scale Marsh Creation - Component E	$172,871,000

[1] Does not include Engineering and Design, which is funded through NFWF.

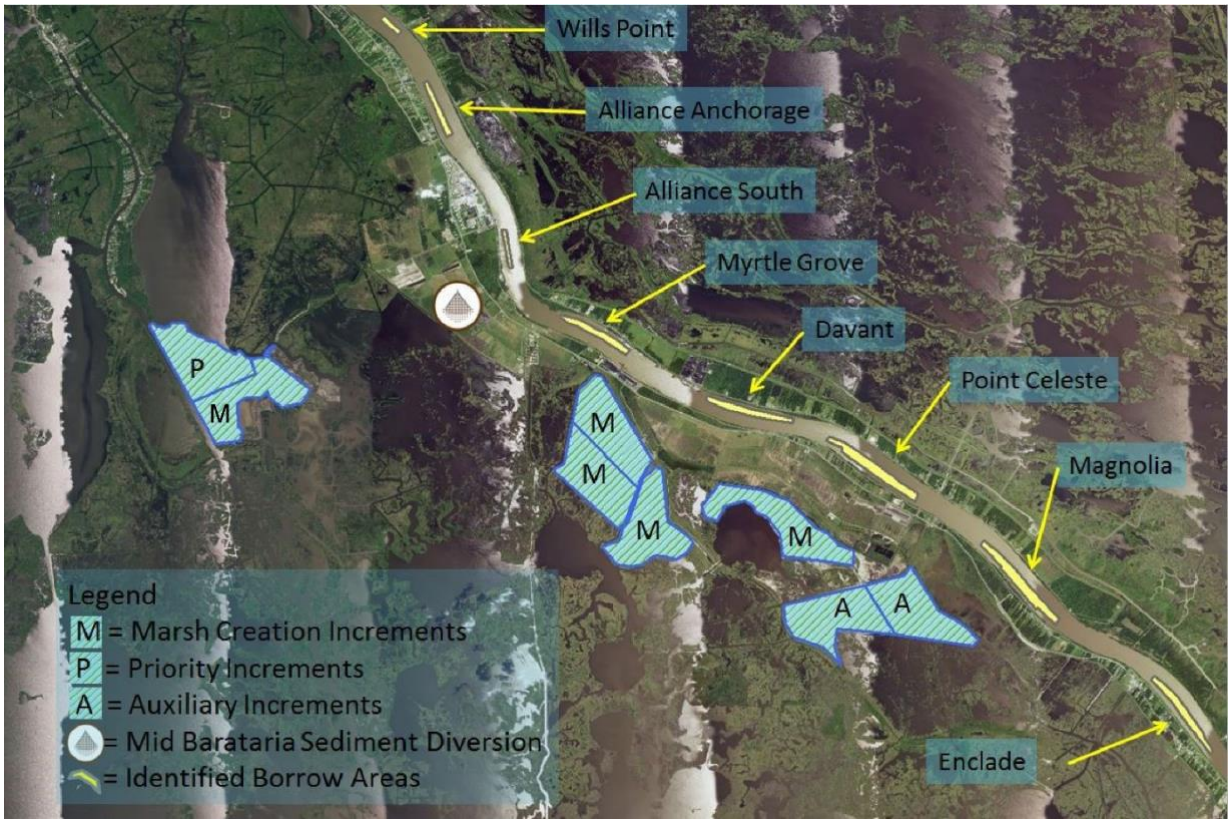

Figure 22 (corrected). Individual marsh creation increments that are part of the Large-Scale Marsh Creation – Component E project. The increment being brought forward for Phase II planning is labeled as a priority increment (P). [Note that in the Draft SRP/EA, two increments were mistakenly labeled as priority increments on this map; this corrected map shows the single priority increment that the LA TIG selects to carry forward into a Phase II restoration plan and NEPA analysis].

As noted above, the Trustees also confirm their 2017 decision to move the Spanish Pass Increment of the Barataria Basin Ridge and Marsh Creation project forward for further evaluation and planning. As discussed in the LA TIG's Restoration Plan #1, the design of the Spanish Pass Increment of the Barataria Basin Ridge and Marsh Creation project will not be affected by the MBSD project, and thus this project will not be delayed by the design, construction, or operation of the diversion.

4.1 Severability of Projects

In this SRP/EA, the LA TIG has selected for further restoration planning and environmental review two restoration projects: the MBSD and one increment of the Large-Scale Barataria Marsh Creation – Component E. Each of these projects is independent of each other and may be individually selected for implementation in this and/or future restoration plans by the LA TIG.

The LA TIG concludes that each project type has independent utility, the construction of one restoration project type does not rely on another for its justification, and each project type would be evaluated in one or more separate restoration plans. While the mutual benefits will not be

achieved without the other projects, each project type retains independent utility. Finally, while not connected actions, to the extent the marsh creation and ridge restoration projects are sufficiently developed to be reasonably foreseeable when the MBSD EIS is prepared, those projects will be included in the cumulative impacts analysis in that EIS.

5.0 Monitoring and Adaptive Management

The PDARP/PEIS identified Monitoring, Adaptive Management, and Administrative Oversight as one of the Trustee's programmatic restoration goals. The DWH NRDA MAM Framework (Chapter 5, Appendix E) provides a flexible, science-based approach to support the effective and efficient implementation of restoration over several decades that provides long-term benefits to the resources and services injured by the spill. The DWH NRDA MAM framework provides a nested approach to the integration of the best available science, monitoring, modeling, and other targeted scientific support to inform restoration planning, construction, and evaluation across multiple scales: for individual restoration projects, for each resource or Restoration Type, and across the entire NRDA restoration program.

5.1 Strategic Approach to Monitoring and Adaptive Management for the Barataria Basin

The Wetlands, Coastal, and Nearshore Habitats Restoration Type is the foundation of the comprehensive, integrated approach to restoration selected as the preferred alternative in the PDARP/PEIS. In addition to compensating for direct injury to coastal and nearshore resources, restoration of these habitats will restore injured ecological functions and benefit the wide array of injured fish, aquatic invertebrates, and animals that depend directly or indirectly on the productivity of the Gulf of Mexico's coastal and nearshore habitats.

The PDARP/PEIS places particular emphasis on the restoration of coastal and nearshore habitat in the historic Mississippi River delta plain, including the Barataria Basin, due to the high level of injury to this region and the wide array of injured resources that depend upon the vast, diverse coastal and nearshore habitats in this region. The high rate of habitat loss in the historic Mississippi River delta plain provides extensive opportunity for large-scale habitat restoration, including through the restoration of natural Mississippi-Atchafalaya River processes.

Given the importance of restoration of the historic Mississippi River deltaic plain to the Wetlands, Coastal, and Nearshore Habitats Restoration Type and achieving the overall ecosystem restoration goals of the PDARP/PEIS, the LA TIG Trustees will implement a strategic approach to Monitoring and Adaptive Management within the Barataria Basin. This basin-scale approach to monitoring and adaptive management will support a portfolio of future restoration projects in the Barataria Basin that are consistent with this Strategic Restoration Plan and will facilitate the assessment of cumulative effects to habitats and resources injured by the DWH spill beyond the scale of the individual restoration project.

5.1.1 System-wide Assessment and Monitoring Program (SWAMP) – Barataria Basin Monitoring Plan

SWAMP was designed as a long-term, comprehensive monitoring program designed to support the development, implementation, and adaptive management of Louisiana's coastal protection and restoration program. The Program provides specific data collection and also leverages other

collection activities on a wide range of variables within the natural and human system (Hijuelos and Hemmerling, 2016.; Figure 23).

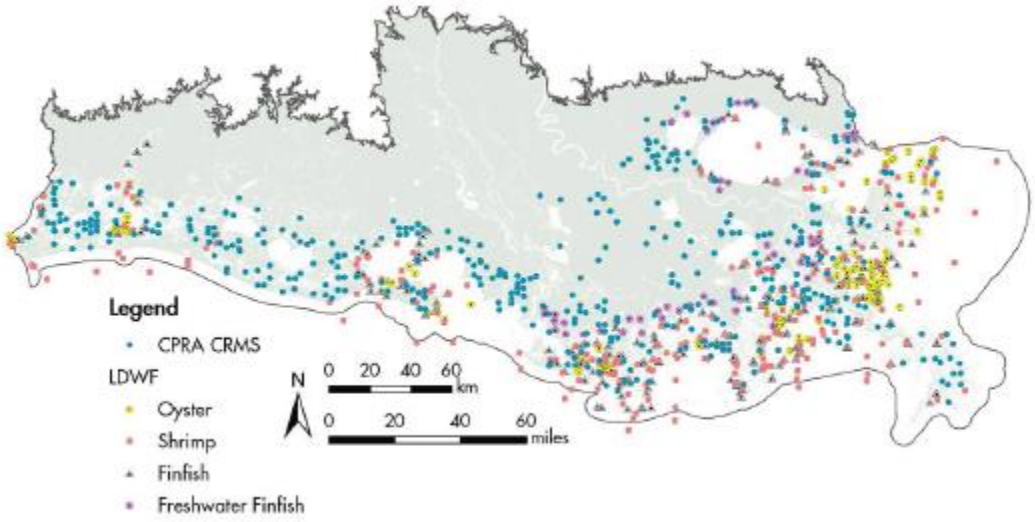

Figure 23. Map of existing biological samples that are leveraged under the SWAMP

The SWAMP monitoring framework is intended to be indicative of system condition or status within all or part of a specific hydrographic basin as well as monitoring Louisiana's coastal zone as a whole. Where necessary, the Program identifies gaps in sampling coverage and augments that data collection to fully meet Program needs (Figure 24). It is consistent with the Deepwater Horizon NRDA MAM framework and will support the planning, construction, and programmatic evaluation of restoration conducted within the Louisiana Restoration Area. The LA TIG Trustees can use the data provided by the SWAMP Barataria Basin monitoring plan to assess changes in the basin over time, allowing assessment of the influence of the portfolio of restoration projects relative to other drivers and long-term trends within the basin.

While the current SWAMP framework may not include all future needs, it will provide valuable data for a number of habitats and resources targeted for NRDA restoration, including coastal wetlands, oysters, and nekton. SWAMP monitoring data related to water quality, hydrology, and the physical terrain will also be useful to the LA TIG Trustees in understanding ongoing changes within the basin, which may assist the Trustees in interpreting the outcomes of individual restoration projects and inform decisions about future restoration actions within the basin.

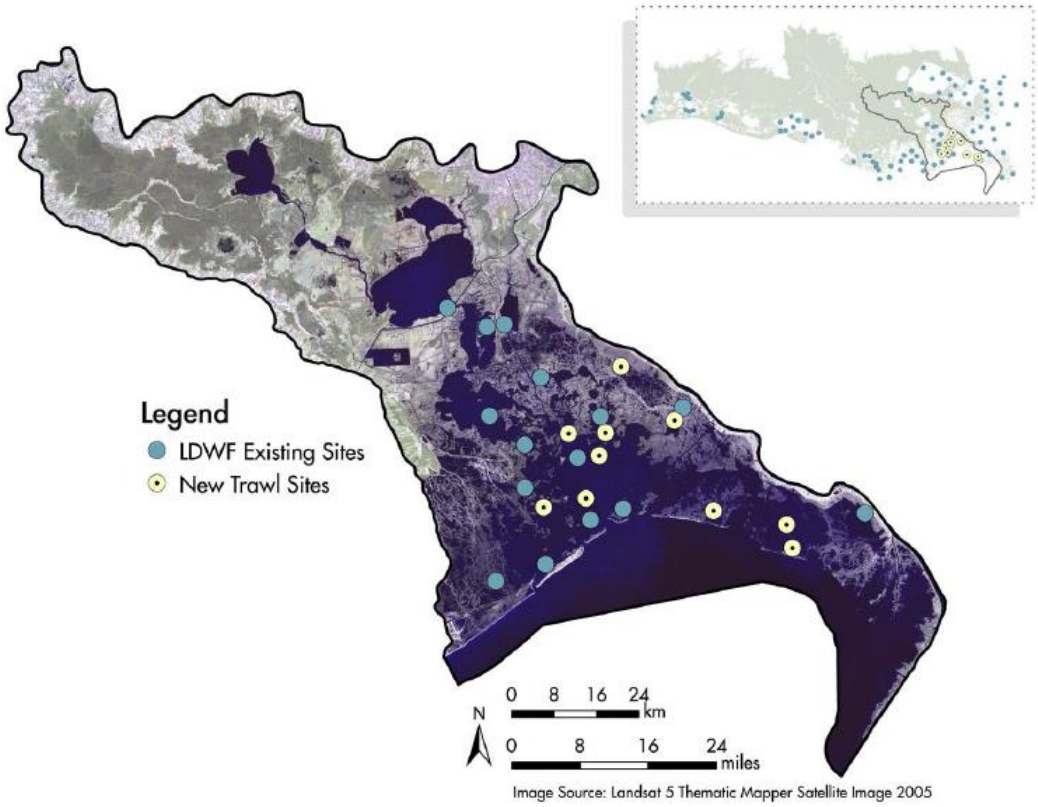

Figure 24. Location of existing LDWF trawl sites as well as additional stations implemented under SWAMP monitoring.

5.1.2 Additional NRDA Basin-scale Monitoring and Adaptive Management

While SWAMP will provide much of the data needed to evaluate restoration progress at a basin-scale, the LA TIG Trustees will need to supplement the data provided by SWAMP to fully support restoration planning, evaluation of restoration progress and collateral impacts, and adaptive management for the suite of resources targeted by NRDA restoration. This could include additional monitoring needed to understand the status and health of injured habitats and resources within the Barataria Basin, collateral impacts of the restoration project on other resource types, such as bottlenose dolphins and sea turtles, as well as monitoring, modeling, and/or targeted applied research needed to evaluate the broader ecosystem benefits/impacts of restoration activities and progress towards achieving the ecosystem restoration goals described in the PDARP/PEIS. MAM activities to address these additional basin-scale information needs will be considered as part of future, tiered restoration plans for the Barataria Basin.

5.2 Project-scale Monitoring and Adaptive Management

The LA TIG will prepare MAM plans and conduct appropriate MAM activities for any projects selected for implementation with DWH NRDA funds. Because the LA TIG has not selected restoration projects in this SRP/EA for construction, and additional restoration planning will be

necessary, no MAM plan is required at this time. Draft MAM plans will be developed in a subsequent Phase II restoration plan for any project alternatives selected for full implementation. All such plans will be developed consistent with the requirements and guidelines set forth in the PDARP/PEIS, the Trustee Council SOPs, and the MAM Manual that has been developed by the cross-TIG MAM work group in accordance with Section 10 of the Trustee Council SOPs.

These project-scale MAM plans will be integrated with Basin and coastwide planning to facilitate evaluation of cumulative restoration actions in the Barataria Basin, including the cumulative benefits of restoration actions for the habitats and resource injured by the spill. Project MAM plans will include performance monitoring to measure progress towards the project's restoration objectives and set forth project-level adaptive management. Project specific monitoring may also include additional data collection needed to inform project adaptive management, monitor potential collateral impacts, and/or better characterize the ecological functions and services provided by the implemented restoration projects. Given the scope and scale of the project alternatives this additional monitoring may include utilization of different collection techniques or changes to sampling frequency or spatial coverage. However, data collection will be guided by the established SWAMP framework to ensure data comparability across projects and basins. These data will also allow the adaptive management of whole systems as data collection will be integrated from coast-wide through project scale.

6.0 Compliance with Other Laws and Regulations

Additional federal and state laws may apply to the projects proposed in this SRP/EA. Legal authorities applicable to restoration project development were fully described in the context of the DWH restoration planning in the PDARP/PEIS, Section 6.9 Compliance with Other Applicable Authorities and Appendix 6.D, Other Laws and Executive Orders. That material is incorporated by reference here.

The LA TIG will ensure compliance with all applicable state and local laws and other applicable federal laws and regulations. The LA TIG will request technical assistance from appropriate regulatory agencies during engineering and design evaluation to proactively identify any compliance issues. Once sufficient information is available for a project, necessary compliance processes will be initiated and a compliance status update provided in a future Louisiana TIG restoration plan and associated NEPA analyses. At this time, the planning nature of the Proposed Action does not require initiation of further environmental consultation and coordination activities.

6.1.1 Additional Federal Laws

Additional federal laws and regulations that may be applicable include, but are not limited to:

- Endangered Species Act
- Magnuson-Stevens Fishery Conservation and Management Act
- Marine Mammal Protection Act
- Coastal Zone Management Act
- Coastal Barrier Resources Act
- Migratory Bird Treaty Act
- Bald and Golden Eagle Protection Act
- Clean Air Act
- Clean Water Act, Rivers and Harbors Act, and Marine Protection, Research and Sanctuaries Act
- Estuary Protection Act
- Archaeological Resource Protection Act
- Farmland Protection Policy Act
- National Historic Preservation Act

Additional Executive Orders (EO):

- EO 11988: Floodplain Management
- EO 11990: Protection of Wetlands

- EO 12898: Environmental Justice
- EO 12962: Recreational Fisheries
- EO 13112: 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

6.1.2 Additional State Laws

Potentially applicable state laws include:

- Archeological Finds on State Lands (La. Rev. Stat. 41:1605)
- Coastal Wetlands Conservation and Restoration Authority (La. Rev. Stat. 49:213.1)
- Coastal Wetlands Conservation and Restoration Plan (La. Rev. Stat. 49:213.6)
- Louisiana State and Local Coastal Resources Management Act (La. Rev. Stat. 49:214.21 – 214.42)
- Louisiana Oil Spill Prevention and Response Act (La. Rev. Stat. 30:2451 *et seq.*)
- Management of State Lands (La. Rev. Stat. 41:1701.1 *et seq.*)
- Louisiana Coastal Resources Program (La. Admin. Code 43:700 *et seq.*)
- Louisiana Surface Water Quality Standards (La. Admin. Code 33.IX, Chapter 11)
- Management of Archaeological and Historic Sites (La. Rev. Stat. 41:1605)
- Oyster Lease Relocation Program (La. Admin. Code 43:I, 850-859, Subchapter B)

7.0 Public Comment on the Draft Strategic Restoration Plan/Environmental Assessment

The public comment period for the Louisiana TIG Strategic Restoration Plan and Environmental Assessment #3: Restoration of Wetlands, Coastal, and Nearshore Habitats in the Barataria Basin, Louisiana opened on December 20, 2017 and closed on February 5, 2018. During the public review period, the Louisiana TIG hosted a public meeting in New Orleans on January 24, 2018.

At the public meeting, the Louisiana TIG accepted written comments, as well as oral comments that were recorded by a court reporter. A Vietnamese translator was available at the meeting, but no comments were provided in Vietnamese. In addition, the Louisiana TIG notified the public in the Federal Register and the Louisiana State Register of opportunities for public comment, including a web-based comment submission site and multiple mailing and email addresses for the public to provide comments. As a result, the Louisiana TIG received comments via the public meetings, web-based submissions to the Department of the Interior's Planning, Environment and Public Comment (PEPC) database, emailed submissions, and mailed-in submissions.

In response to this opportunity for public comment, the Louisiana TIG received approximately 176 submissions from private citizens; businesses and industry organizations; federal, state, and local agencies; and non-governmental organizations. Similar or related comments contained in the submissions have been grouped and summarized for purposes of this response. All comments submitted were reviewed and considered by the Louisiana TIG prior to finalizing this SRP/EA. All comments submitted are represented in the summary comment descriptions listed in this Section, and all public comments, whether written or oral, will be included in the Administrative Record (https://www.doi.gov/deepwaterhorizon/adminrecord).

7.1 The Comment Analysis Process

Comment analysis is a process used to compile similar public comments into a format that can be addressed efficiently. Comments were sorted into logical groups by topics and issues, consistent with the range of topics applicable to the Draft SRP/EA. The process was designed to capture and condense all comments received rather than to restrict or exclude any comments. The comment analysis process allows the LA TIG to provide an organized and comprehensive response to public comments, consistent with OPA and NEPA regulations.

Abt Associates' CommentCounts database was used to store the full text of all submissions and allows each comment to be grouped by topic and issue. All comments were read and analyzed, including those of a technical nature; those that contained opinions, feelings, and preferences for one alternative over another; and comments of a personal or philosophical nature.

7.2 Comments Summary

Below is a summary of the comments received by the Louisiana TIG during the comment period and the LA TIG's response.

7.2.1 General Comments Received about the SRP/EA

1. Comment:

A number of commenters focused on the site-specific impacts projected to occur from construction and operation of a large sediment diversion and the need to monitor, mitigate and adaptively manage such impacts.

Response:

In the Draft SRP/EA, the LA TIG explained that the EA would tier from the PDARP/PEIS and incorporate relevant discussions and analyses by reference. The Final SRP/EA would be followed by one or more Phase II restoration plans evaluating restoration projects at the project-specific level with additional NEPA and OPA analyses. For purposes of the SRP/EA, the LA TIG explained it had preliminarily determined that the PDARP/PEIS had evaluated the environmental impacts of the restoration techniques, and that the impacts resulting from the Proposed Action and alternatives were covered within the scope of the programmatic analysis. While the environmental impacts of the restoration techniques were addressed in the PDARP/PEIS, the EA was focused on a comparative analysis of the environmental impacts of the strategic restoration alternatives proposed in the SRP/EA; this alternatives analysis was not conducted in the higher-level PDARP/PEIS. The LA TIG found, based on this analysis, that the environmental impacts of each alternative were consistent with the impacts predicted in the PDARP/PEIS, and there were no new or significant environmental impacts or issues identified. After reviewing public comments on the Draft SRP/EA, the LA TIG reaffirmed this determination. In addition, the LA TIG believes the level of NEPA analysis is appropriate to the planning nature of the decision being made. It is not intended to be project-specific in scope as no decisions have yet been made to authorize, locate, design and operate specific projects.

The objective of this analysis was to ensure that the public had sufficient information on the potential beneficial and adverse impacts of the proposed restoration techniques, including large-scale sediment diversion, to meaningfully comment and participate in the process; and, similarly to ensure that the LA TIG had sufficient environmental information regarding the restoration techniques to understand the environmental impacts and costs and benefits before making a decision to proceed to Phase II restoration planning. No irretrievable commitment of resources is made by the SRP/EA. The LA TIG is committed to analyzing project-specific environmental impacts in the NEPA processes associated with Phase II restoration planning for any proposed restoration project. Those projects include the restoration projects selected for further restoration planning and NEPA analysis in the SRP/EA. Mitigation, monitoring and adaptive management will be considered as part of Phase II restoration plans and associated NEPA analysis addressed in project-specific analysis. This NEPA approach is clarified in the Final SRP/EA in Section 3.

2. Comment:

A commenter urged the TIG to make investments now to retain ecosystem functions in the future.

Response:

The LA TIG acknowledges and appreciates this comment. The LA TIG stated in Section 4.0 above, "Based on the historic loss of marsh habitat in the Barataria Basin, which was demonstrably accelerated and exacerbated by impacts from the DWH oil spill, the LA TIG has identified an immediate and urgent need to continue to carry forward projects for further restoration planning and environmental analysis that will address coastal habitat loss to provide for a more sustainable coast, and that will provide ecosystem-scale benefits to offset ecosystem-scale losses from the spill." In considering how investments now will help retain ecosystem functions in the future, the LA TIG realized that in the Draft SRP/EA they had stated the need to carry forward restoration projects to "arrest coastal habitat loss", but the forces contributing to coastal habitat loss may not be able to be fully arrested through restoration. Thus, the LA TIG agrees with the commenter that timely implementation of restoration is necessary to best retain ecosystem functions in the Barataria Basin and address coastal habitat loss.

3. Comment:

Commenters voiced support for restoration of areas harmed by the BP oil spill, for full funding of the restoration initiative, and urged the TIG to act quickly.

Response:

The LA TIG acknowledges and appreciates this support.

4. Comment:

A commenter endorsed the Louisiana Coastal Master Plan and recommended that the Master Plan be used as a basis for any restoration work plan in the Barataria Basin.

Response:

The LA TIG appreciates the key role of the Louisiana Coastal Master Plan for restoration planning in Louisiana. On April 28, 2017, a Notice of Intent (NOI) was published in the Federal Register (FR) by the LA TIG announcing its intention to prepare a Strategic Restoration Plan for the Barataria Basin, Louisiana, that would consider identifying habitat restoration components of the Louisiana Draft 2017 Coastal Master Plan (Draft 2017 CMP), among other feasible alternatives, to serve as an OPA Strategic Restoration Plan for restoring wetlands, coastal, and nearshore habitat in the Barataria Basin, Louisiana, consistent with OPA and the Trustees' PDARP/PEIS. In addition, the LA TIG screened all CMP projects of potential geographic and ecological relevance to this SRP/EA. All of the projects proposed in the SRP/EA for advancement and further evaluation are projects included in the 2017 Louisiana Coastal Master Plan.

5. Comment:

A commenter expressed general support for advancing a select slate of projects for further evaluation.

Response:

The LA TIG acknowledges and appreciates this support.

6. Comment:

A commenter urged the TIG to consider the effects of climate change, like sea level rise, in any future planning.

Response:

The LA TIG has considered subsidence and sea level rise in their assessment of alternatives for the SRP/EA. The SRP/EA stated that "If correctly designed, sited, and operated, large-scale sediment diversions will help restore injured wetlands and resources by reducing widespread loss of existing sediment deposition to partially offset relative sea level rise and help build and maintain wetlands (Andrus, 2007; Day et al., 2012; DeLaune et al., 2003; DeLaune et al., 2013; Kemp et al., 2014).

7. Comment:

Commenters described the benefits of sediment diversions, including: restoring and rebuilding injured wetlands, restoring natural deltaic processes, preventing further land loss, offsetting relative sea level rise, greater cost-effectiveness over the long-term, and ecosystem-level benefits that cannot be achieved through smaller projects.

Response:

The LA TIG appreciates the commenters' recognition of the various benefits of sediment diversions that were articulated in the SRP/EA and in the PDARP/PEIS.

8. Comment:

A commenter stated that a sediment diversion would harm shrimp populations and close off currently navigable waterways. The commenter suggested that it is better to dredge and pipe sand and build one island at a time further out.

Response:

The LA TIG appreciates the commenter's concern. The LA TIG has acknowledged and considered the potential for moderate to major adverse impacts to biological resources, as well as both short and long term impacts to fisheries. The potential impact from any specific sediment diversion project on shrimp populations will be evaluated through subsequent Phase II restoration plans and NEPA analyses. As mentioned in a previous response, the LA TIG did not include a focus on barrier island creation as part of the SRP/EA because the LA TIG has previously focused on restoring barrier islands and headland habitat in the Barataria Basin as part of the approved Early Restoration Phase III Louisiana Outer Coast Restoration Program, with an estimated cost to implement of over $318 million. In addition, although barrier islands can provide some level of protection to interior marshes by breaking wave energy from tides, barrier islands are not a long-

term sustainable outcome for the protection of interior basin marshes against the forces of subsidence and sea level rise.

9. Comment:

Commenters commended the LA TIG on their thorough, science-based process for screening restoration projects and their transparency in analysis.

Response:

The LA TIG acknowledges and appreciates this support.

7.2.2 Comments Regarding New Projects, Alternatives or Elements

1. Comment:

A commenter suggested that small to moderately sized diversions should provide long term sustainability in conjunction with building land now. The commenter also suggested reevaluating proposed controlled diversions of 20,000 cubic feet per second (cfs), 25,000 cfs, 30,000 cfs, 35,000 cfs, 50,000 cfs, and 75,000 cfs in conjunction with the proposed marsh and ridge restoration.

Response:

The LA TIG appreciates the commenters question regarding the scale of the potential sediment diversion. The LA TIG selected a "large-scale" sediment diversion in the Draft SRP/EA because they wanted to ensure that the sediment diversion, if constructed, provides Basin-wide restoration benefits, extending into the Gulf of Mexico. (Draft SRP/EA, p. 2-20 to 2-22).

As part of the Phase II restoration plan and EIS, the LA TIG will further define the specific capacity of the proposed large-scale sediment diversion, particularly what capacity is needed to achieve the desired scope of benefits. As currently proposed, the Mid-Barataria Sediment Diversion would operate at a maximum capacity of 75,000 cfs. While that would be the maximum capacity, the capacity at which the diversion would actually operate at any particular time would depend on the flow in the Mississippi River, and the relative water height difference between the Mississippi River and the receiving area. As a result, a sediment diversion designed to accommodate a maximum flow capacity of 75,000 cfs will also operate at lower capacities (between 5,000 and 75,000 cfs) at various times depending on conditions. Thus, as part of evaluating a large-scale sediment diversion, the LA TIG anticipates evaluating the environmental consequences of the diversion operating at a variety of capacities. The details of this analysis will be provided in the Phase II restoration plan and EIS.

Regarding the suggestion that the LA TIG evaluate various sediment diversion capacities in conjunction with the proposed marsh creation and ridge restoration projects, the LA TIG notes they considered multiple restoration techniques together as part of the Draft SRP/EA (see p. 3-38). Based on that analysis, the LA TIG concluded that the various restoration project types are mutually beneficial, but that each project type is separate with independent utility (Draft SRP/EA, p. 4-3). The combination of a sediment diversion and other restoration projects will be evaluated as part of the cumulative impacts discussions in the EIS for the MBSD project.

2. Comment:

A commenter stated that project money would be better spent by building pipelines to carry sediment to areas that need rebuilding, beginning with barrier islands. A commenter also suggested replanting cypress, noted the importance of barrier islands to offset saltwater intrusion, and requested more timely implementation of restoration for all the coasts based on scientific data.

Response:

The LA TIG appreciates the support for rebuilding habitat through pipelines carrying sediment, for beginning with barrier islands, and also for replanting cypress. The LA TIG did not include a focus on barrier island creation as part of the SRP/EA because the LA TIG has previously focused on restoring barrier islands and headland habitat in the Barataria Basin as part of the approved Early Restoration Phase III Louisiana Outer Coast Restoration Program, with an estimated cost to implement of over $318 million. In addition, although barrier islands can provide some level of protection to interior marshes by breaking wave energy from tides, barrier islands are not a long-term sustainable outcome for the protection of interior basin marshes against the forces of subsidence and sea level rise. The LA TIG has not focused on replanting cypress swamp in the SRP/EA because cypress swamp did not sustain the same heavy oiling as the coastal wetlands in Barataria Basin.

In the SRP/EA, the LA TIG selects to advance several projects for further evaluation and planning, which involve creating habitat through carrying sediment to targeted locations: the Mid-Barataria Sediment Diversion and one marsh creation increment within Large Scale Marsh Creation - Component E in Barataria Basin. However, as discussed in the SRP/EA, an alternative that only includes marsh creation and ridge restoration projects benefit fewer acres, has decreased longevity, and does not restore deltaic processes. Thus, the LA TIG believes that relying only on projects created by sediment delivery through pipelines would not best accomplish their objective of restoring ecosystem-level injuries in the Gulf of Mexico through restoration in the Barataria Basin.

3. Comment:

A commenter suggested inclusion of a complementary project to help benefit the broader basin, enhance multiple habitat types, mitigate effects of other restoration operations and enhance resiliency. The suggested method involves building blocks out of living oysters to stabilize 20 to 50 miles of shoreline along shallow, coalescing ponds and bayous along a line generally following the eastern boundary of the Belle Pass-Golden Meadow Marsh Creation Master Plan project.

Response:

The LA TIG appreciates the suggestion of a complementary oyster project and encourage the commenter to submit this project idea for future consideration through the Louisiana project portal at http://la-dwh.com/PublicSubmittal/ProjectFormHome.aspx or the federal project portal at http://www.gulfspillrestoration.noaa.gov/restoration/give-us-your-ideas/suggest-a-restoration-project.

As noted in the SRP/EA, the LA TIG has previously restored oyster reef habitat in the Barataria Basin as part of the Early Restoration Phase I Louisiana Oyster Cultch Project and have additional resources available to support potential future oyster reef projects through the direct allocation to the oyster resource. Thus, direct restoration of oyster reef habitat is not a focus of this SRP/EA. In addition, while shoreline protection projects were included as part of Alternative 2, this alternative was not selected by the LA TIG as the preferred alternative.

7.2.3 Comments Regarding Monitoring and Adaptive Management

1. Comment:

Commenters proposed mandatory, rather than optional, data collection and monitoring before, during, and after project implementation. Commenters stated that assessments must focus on potential adverse impacts of large scale habitat restoration to natural resources, particularly to species injured by the BP disaster, to enable ongoing design and implementation modification with the intent of avoiding, minimizing, and mitigating impacts to the greatest extent possible through adaptive management. Commenters noted that this data collection must include monitoring chemicals, particularly nutrients, pesticides and herbicides in the Mississippi River; active ongoing monitoring of the health, population dynamics, reproductive success, habitat use and movement over time of the resident population of Barataria Bay dolphins; analysis of potential changes in salinity and turbidity, which would adversely impact estuarine resources such as oysters, brown shrimp, etc. A commenter also noted that adaptive, robust modeling should be in place before proceeding with a large-scale project that could destroy a community.

A commenter stated that the SRP/EA does not cite all relevant recent literature that assessed impacts to the Barataria Bay dolphin population and recovery trajectory, noting that these more recent publications show continued evidence of adverse health effects including on their respiratory system and reduced reproductive success.

A commenter recommended that the LA TIG work with the Cross-TIG Monitoring and Adaptive Management work group to develop and implement a monitoring and adaptive management program for large-scale habitat restoration projects that incorporates best practices for marine mammals identified in the NAS 2017 report "Effective Monitoring to Evaluate Ecological Restoration in the Gulf of Mexico" and existing marine mammal monitoring programs as referenced in previous communications to the DWH NRDA Trustees.

Response:

The LA TIG appreciates the commenters' concerns regarding the Adaptive Management and Monitoring needs of large-scale ecosystem restoration projects. To help address these concerns, each implemented project will have a project-specific Monitoring and Adaptive Management (MAM) Plan that will address the need to measure project success as well as monitor for project impacts. The LA TIG will develop these project-specific MAM plans as part of the Phase II restoration plans. These plans will detail the data collection, analysis, and adaptive management steps that will occur during the design and implementation of projects. These plans, as well as overall programmatic MAM plans, will draw, in large part, from the State of Louisiana's "System-Wide Assessment and Monitoring Program" (SWAMP) (Hijuelos and Hemmerling 2016). The

SWAMP monitoring program, underway in the Barataria Basin, will provide important baseline data in advance of any project initiation. SWAMP and any project-specific programs, are designed to "feed-back" to the Adaptive Management process to ensure a collaborative and coordinated approach to DWH restoration efforts.

The LA TIG is aware of and has reviewed recent literature, including the Hornsby et al. (2017) and Wells et al. (2017) studies. With regard to the studies cited regarding the health status of the Barataria Basin dolphin population, the LA TIG notes that the referenced studies, while published after the completion of the PDARP/PEIS, were based on data collected as part of the injury assessment for the DWH oil spill. That injury assessment forms the basis of the PDARP/PEIS analysis of impacts from the oil spill as well as potential impacts from various restoration activities (including sediment diversions). Thus, these studies do not provide additional data that were not analyzed as part of the PDARP/PEIS. The SRP/EA does not require project-specific MAM plans, which will be developed as part of the Phase II restoration plans and will continue to consider best available science.

The LA TIG also appreciates the comment requesting collaboration between the LA TIG and the Cross-TIG workgroups. The LA TIG Trustees all have representatives that serve on the Cross-TIG workgroup, which helps to ensure that both programmatic and project-specific MAM plans and processes for restoration activities within the Barataria Basin are coordinated with the Cross TIG workgroup. The LA TIG, with the input of the Cross-TIG workgroup, will continue to incorporate best-available information into future planning efforts.

2. Comment:

A commenter requested that all mitigation and adaptation efforts be collaboratively designed and equitably implemented with communities who are negatively impacted by the large-scale restoration project.

Response:

The LA TIG acknowledges the individuals and communities who are concerned for how they will need to adapt to the large-scale restoration project and the desire for collaborative design with potentially impacted communities. An evaluation of potential impacts and any needed mitigation will be conducted as part of subsequent Phase II restoration plans and associated NEPA analyses, which will include an opportunity for public comment. The Trustees are committed to outreach and engagement with the public, including potentially affected communities.

The projects incorporated in the SRP/EA alternatives are included in the 2017 Coastal Master Plan. During the development of the 2017 Coastal Master Plan, the CPRA conducted a series of community conversations across coastal Louisiana, to hear residents' perspectives about successful flood risk mitigation efforts, and to receive feedback on draft lists of potential projects. As part of the Diversion Program, over the past year, CPRA's Sediment Diversion Program Team has hosted office hours twice a month in Coastal Louisiana parishes to provide citizens an opportunity to learn more about these projects, ask questions, and pick up informational materials. Through these "Coastal Connections" events, CPRA staff has visited with hundreds of coastal residents, to provide project information and address misconceptions or misinformation

surrounding sediment diversions. In addition, the monthly meetings of the CPRA Board provide an avenue for citizens to stay apprised of the progress on the diversion program, through regular updates from the project team and the CPRA leadership.

7.2.4 Comments Regarding Alternative 1: Marsh Creation and Ridge Restoration Plus Large-scale Sediment Diversions

7.2.4.1 General

1. Comment:

A commenter acknowledged that the concept of sequencing, as described in the SRP/EA, has merit and supported the timely use of the sediment resources available. The commenter also asked the TIG to consider additional variables in project sequencing, like timing of funding availability and ongoing environmental reviews.

Response:

The LA TIG acknowledges and appreciates support for sequencing projects, as described in the SRP/EA. The LA TIG also confirms that they take into account funding availability and the timing and duration of environmental reviews in their project sequencing plans.

7.2.4.2 Support

1. Comment:

A commenter voiced support for alternative 1, under the condition that the Trustees reduce any adverse impacts to "trust" resources and species injured by the BP disaster.

Response:

The LA TIG acknowledges and appreciates the support for Alternative 1. In subsequent restoration planning and NEPA analyses for the LA TIG's decisions of whether to select a restoration project for construction, the LA TIG will conduct a project-specific evaluation of potential impacts to natural resources injured in the DWH oil spill. Subsequent plans will consider potential mitigation measures.

2. Comment:

Commenters expressed support for the LA TIG Draft Strategic Restoration Plan and Environmental Assessment #3: Restoration of Wetlands, Coastal, and Nearshore Habitats in the Barataria Basin.

Commenters discussed the importance of restoring the natural deltaic processes of the Mississippi River for overall ecosystem health and viability. Commenters noted that reconnecting the Mississippi to the delta would provide a wide array of benefits, including: increased sediment and nutrient flow, rebuilding lost coastline, and protecting threatened wildlife.

Commenters voiced support for the restoration plan because it provides for a combination of marsh creation and ridge restoration plus large-scale sediment diversions to provide the greatest

ecosystem benefits in a cost-effective manner. Commenters stated that the proposed combination of techniques would be more effective than implementing one component alone.

Commenters expressed that a large-scale restoration project is necessary, rather than continuing smaller restoration efforts. Commenters often made the secondary point that large-scale restoration is an essential investment for the long-term stability of Barataria Basin.

Commenters stated their concern that not implementing Alternative #1 could lead to additional land loss in the Barataria Basin, causing ecosystem collapse.

Response:

The LA TIG acknowledges and appreciates the support for Alternative 1. The LA TIG agrees that restoring the natural deltaic processes of the Mississippi River through large-scale sediment diversions is needed for overall ecosystem health and viability and will provide a wide array of benefits. The LA TIG agrees that the suite of projects, including marsh creation and ridge restoration, has the potential to provide the greatest level of benefits to injured Wetlands, Coastal, and Nearshore habitats and to the large suite of injured resources that depend in their lifecycle on productive and sustainable wetland habitats. In subsequent restoration planning and NEPA analyses for the LA TIG's decisions of whether to select a restoration project for construction, the LA TIG will evaluate potential project-specific benefits for any specific project considered for construction.

7.2.4.3 Oppose

1. Comment:

Commenters expressed opposition to the preferred alternative (Alternative 1) for reasons including user conflicts and sociopolitical opposition to implementation, harm to bottlenose dolphins in Barataria Bay, harm to oysters, harm to commercial fishing industry, induced flood risk, induced shoaling, environmental justice, increased pollutants and contaminants, harm to living resources, increased invasive species, and potential isolation of individuals living in areas from La Reussite to Port Sulphur.

Response:

The LA TIG acknowledges the concerns expressed by commenters about the wide range of potential impacts from implementation of large-scale sediment diversions in general, and the Mid-Barataria Sediment Diversion in particular, and have considered these potential impacts in its decision. In subsequent restoration planning and NEPA analyses for the LA TIG's decisions of whether to select a restoration project for construction, the LA TIG will evaluate potential impacts to the categories noted by the commenters. The PDARP/PEIS analyzed the impacts from these restoration techniques; the LA TIG has not identified any new significant impacts.

7.2.4.4 Baseline Conditions

1. Comment:

Commenters requested additional baseline analyses by the LA TIG and the Army Corps of Engineers including: ensuring that there are enough water gauges and instruments installed in

multiple locations in the Bay/Basin to gather comprehensive and real-time data on water quality, flow, salinity, dissolved oxygen, fecal coliform, circulation pattern and sediment flow; analysis of sediments for contaminants and fecal coliform; and establishing pathways for sediment deposit and ensuring those deposits do not cover or silt over oyster grounds.

In addition, commenters requested a thorough assessment of the marine resources that would likely be impacted by this project; conducting surveys and stock assessments to establish baseline population estimates on oyster abundance in Barataria Bay and Basin prior to project construction with annual follow-up surveys after implementation; establishment of a baseline level and monitoring of dissolved oxygen content and nutrient loading safe for survival of oysters and other fisheries and to avoid formation of mini-hypoxic zones; fully mapping the Bay/Basin oyster reefs and lease areas in order to anticipated changes in predator-prey dynamics as well as increased or reduced disease risk; establishment of a multi-year study plan in Barataria Bay for dolphins and the environmental factors that influence dolphins; a comprehensive economic analysis of potential impacts to the seafood industry, including not only the direct impacts of areas in the outfall vicinity but also surrounding areas.

Response:

The LA TIG appreciates the commenters' concerns regarding the monitoring needs of large-scale ecosystem restoration projects. To help address these concerns, each implemented project will have a project-specific MAM Plan that will address the need to measure project success as well as monitor for project impacts. The LA TIG will develop these project-specific MAM plans as part of the Phase II restoration plans, which will include pre-construction monitoring as well as post-construction monitoring for system responses. These plans, as well as overall programmatic MAM plans, will build on the framework from the State of Louisiana's "System-Wide Assessment and Monitoring Program" (SWAMP) (Hijuelos and Hemmerling 2016). The SWAMP monitoring program, underway in the Barataria Basin, will provide important baseline data in advance of any project initiation. SWAMP and any project-specific programs, are designed to "feed-back" to the Adaptive Management process to ensure a collaborative and coordinated approach to DWH restoration efforts.

7.2.4.5 Suitability of Sediment

1. Comment:

A commenter expressed concerns about the suitability of sediments from the Mississippi River to be added into the Mid-Barataria estuary. Their concerns included the possibility for sediments to contain elevated levels of Poly-Aromatic Hydrocarbons and other chemical pollutants.

Response:

The LA TIG acknowledges the concerns expressed by the commenter about the suitability of Mississippi River sediments being added into the Mid-Barataria estuary and the potential for contaminated sediments from the Mississippi River being transported to the Barataria Basin. As explained in Section 1, the SRP/EA is a strategic planning document that selects a restoration approach for the Barataria Basin and several restoration projects for further consideration in subsequent Phase II restoration plans and associated NEPA analyses.

7.2.4.6 Contaminants

1. Comment:

A commenter expressed concerns about the elevated levels of polycyclic aromatic hydrocarbons (PAHs) that are found in the Mississippi River. The high levels of PAHs could inhibit the marsh creation that the MBSD project seeks to accomplish and could have a negative impact on commercially important natural resources. The commenter also suggested that the LA TIG review the reference, "Concentrations and sources of polycyclic aromatic hydrocarbons in surface coastal sediments of the northern Gulf of Mexico" by Wang et al., 2014b.

Response:

The LA TIG acknowledges the concerns expressed by the commenter about the potential for elevated levels of PAHs being transported from the Mississippi River to the Barataria Basin and having a negative impact on resources in the Barataria Basin. As explained in Section 1, the SRP/EA is a strategic planning document that selects a restoration approach for the Barataria Basin and several restoration projects for further consideration in subsequent Phase II restoration plans and associated NEPA analyses.

Analyses of project-specific impacts such as PAH transport, as well as any mitigation, will be evaluated through subsequent Phase II restoration plans and associated NEPA analyses for any specific project being considered for construction. The LA TIG has reviewed the citation provided by the commenter and will continue to consider best available science through subsequent Phase II restoration plans and associated NEPA analyses.

7.2.4.7 Hypoxia

1. Comment:

A commenter expressed concerns that if the diversion project is implemented then it could cause a dead zone within vital estuarine habitat before a majority of the species could grow large enough to escape hypoxic zones in the areas directly impacted.

Response:

The LA TIG acknowledges the concerns expressed by the commenter about the potential for a diversion project creating a hypoxic zone within the estuary that could impact estuarine-dependent species. This potential impact from any specific project considered for construction will be evaluated through subsequent Phase II restoration plans and associated NEPA analyses. As explained in Section 1, the SRP/EA is a strategic planning document that selects a restoration approach for the Barataria Basin and several restoration projects for further consideration in subsequent Phase II restoration plans and associated NEPA analyses.

7.2.4.8 Oyster Impacts

1. Comment:

A commenter opposes construction of the Mid-Barataria Sediment Diversion and the Ama Sediment Diversions because the projects will negatively affect area water flow, salinity,

sedimentation, and water quality to the detriment of oyster survival and production in the Barataria Bay and Basin and more broadly the Mississippi River Delta. Impacts could also include greater access of Mississippi River fecal coliform contamination into the Barataria-Terrebonne estuary and likely more frequent and larger area closures to oyster harvest. A commenter noted that the Draft SRP claims that the Diversion could result in the creation of 30,000 acres of new marsh, but does not answer where that acreage would be created and how much it might displace existing oyster habitat, where oyster populations might reasonably re-locate, or how oyster fisheries would be impacted. A commenter also noted potential burial of spat producing oyster reefs and asked if losing the reefs would push the Barataria oysters past a critical threshold.

A commenter noted that the LA TIG should be aware of Federal appropriations bills funding the Corps annual budget that have included report language to consider water quality and salinity impacts on oyster reefs and, when appropriate, to mitigate any negative impacts. The commenter also noted that concerns about the Mid-Barataria Sediment Diversion are informed by experience with the Caernarvon and Davis Pond Freshwater Diversions, the Bonnet Carre Spillway and Bohemia Salinity Control Structure that have altered the area ecosystem in ways harmful to oysters, including increased sedimentation and reduction in salinity levels.

A commenter urged the LA TIG to develop mitigation planning, recommendations and implementation for public oyster reef and private lease areas where oyster loss is expected to be significant.

Response:

The LA TIG acknowledges the concerns expressed by commenters about the potential impacts to oyster survival and production from the operation of sediment diversions. These potential impacts were considered and disclosed in the PDARP/PEIS. The SRP/EA did not identify any new or significant impacts. As explained in Section 1, the SRP/EA is a strategic planning document that selects a restoration approach for the Barataria Basin and several restoration projects for further consideration in subsequent Phase II restoration plans and associated NEPA analyses.

Analyses of project-specific impacts, as well as any mitigation, will be evaluated through subsequent Phase II restoration plans and associated NEPA analyses for any specific project being considered for construction.

7.2.4.9 Fish and Crustacean Impacts

1. Comment:

A commenter noted that the impact to sediments in essential fish habitat from the proposed MBSD project will have substantial impacts in the short-term to various species, such as oysters, shrimp, and blue crab, and could destroy key shrimping habitats necessary for the livelihood of shrimpers. A commenter mentioned that changes in water temperature from the MBSD will drastically alter fish habitats that are critically dependent on stable warm temperatures to optimally grow.

Response:

The LA TIG acknowledges the concerns expressed by the commenter about the potential for the Mid-Barataria Sediment Diversion project impacting essential fish habitat for economically important species and affecting the livelihood of fishermen. These potential impacts were considered and disclosed in the PDARP/PEIS. The SRP/EA did not identify any new or significant impacts. As explained in Section 1, the SRP/EA is a strategic planning document that selects a restoration approach for the Barataria Basin and several restoration projects for further consideration in subsequent Phase II restoration plans and associated NEPA analyses.

Analyses of project-specific impacts, as well as any mitigation, will be evaluated through subsequent Phase II restoration plans and associated NEPA analyses for any specific project being considered for construction.

7.2.4.10 Marine Mammal Impacts

1. Comment:

A commenter noted that the SRP/EA flows from the PDARP/PEIS document and that the PDARP/PEIS does not provide specificity regarding how to mitigate the harm to marine mammals that can accrue from diversions and other habitat modifications. A commenter also noted that potential impacts to Barataria Bay dolphins appear to be inadequately assessed in the SRP/EA and lack consideration of mitigation and adequate pre- and post-project monitoring of habitat use. The commenter noted that the SRP/EA omits consideration of the most recent literature on the status of dolphins in Barataria Bay. The commenter noted that a study by Hornsby et al. (2017) included a definition of an absolute limit of salinity of 8 ppt and further noted that the SRP/EA does not specify a degree of biological harm that would trigger closure of the diversion structure. The commenter also cited a study by Wells et al. (2017) that documented multi-year site fidelity by dolphins to small home ranges in Barataria Bay, noting that it would be inappropriate to assume that dolphins can move at will throughout the larger area of the Delta's nearshore waters. The commenter also requested greater details on the cumulative impacts to the bottlenose dolphin population as well as mitigation options to alleviate these impacts.

A commenter noted that large-scale sediment diversions may have significant adverse impacts on bottlenose dolphins resident to Barataria Basin resulting from sudden, large and sustained influxes of fresh water into estuarine dolphin habitat. The commenter noted the need for studies of the behavioral response of dolphins to changes in prey availability, distribution and species composition in response to salinity changes and a better understanding of the cumulative effects of multiple stressors on dolphins. The commenter also noted the need to evaluate the impact of the proposed diversions on dolphin reproductive success. The commenter also noted that the potential for significant individual and cumulative impacts on the Barataria Bay stock of bottlenose dolphins warrants additional monitoring and analyses under both the Marine Mammal Protection Act (MMPA) and the National Environmental Policy Act (NEPA), noting that "takes" of marine mammals are prohibited under the MMPA, with certain exceptions.

A commenter recommended that LA TIG work with NMFS, the U.S. Army Corps of Engineers, and the State of Louisiana Coastal Protection and Restoration Authority to (1) ensure that multi-year studies are conducted in Barataria Bay that would provide adequate baseline information on

bottlenose dolphins, their prey species and habitat and (2) develop a robust predictive model to estimate the number and types of takes of bottlenose dolphins that may occur incidental to diversion projects. The commenter noted that analyses should be conducted before decisions are made regarding the development and implementation of the diversion to better identify and incorporate effective measure to minimize adverse short- and long-term impacts on Barataria Bay bottlenose dolphins and their prey.

Response:

The LA TIG acknowledges the concerns expressed about the potential for a diversion project and other habitat modifications to harm marine mammals in Barataria Bay. As to the commenter's specific comments regarding MMPA incidental take authorization, MMPA compliance will be in accordance with Section 20201 of Title II of Public Law No 115-123, which specifically addresses the application of the MMPA to the Mid-Barataria Sediment Diversion.

The LA TIG also acknowledges the need for additional baseline and post-construction monitoring and studies, which will be detailed in a project-specific MAM plan. This plan will describe the data collection, analysis, and adaptive management steps that will occur during the design and implementation of any diversion projects.

The LA TIG disagrees that potential impacts to Barataria Bay dolphins were inadequately assessed in the SRP/EA, noting the acknowledgment in Section 3.2.1.2.4 that "Reductions in salinity also have the potential to adversely impact BSE marine mammals, including the stock of bottlenose dolphins in Barataria Bay, possibly resulting in illness and death." The LA TIG is aware of and has reviewed the Hornsby et al. (2017) and Wells et al. (2017) studies, as noted in response to comment 1 in Section 7.2.3, above. Those studies are based on data that were also analyzed as part of the PDARP/PEIS, which is incorporated in the SRP/EA analysis of impacts to dolphins. The LA TIG will continue to consider best available science in its evaluation of potential impacts to marine mammals that will be conducted in subsequent Phase II restoration plans and associated NEPA analyses for any specific diversion projects considered for construction. These evaluations will include consideration of cumulative impacts and potential mitigation options.

7.2.4.11 Socioeconomic Impacts

1. Comment:

A commenter suggested that LA TIG and the Corps conduct a socio-economic analysis of the project's expected impact on the Gulf of Mexico oyster industry. The analysis should encompass not only oyster harvesters and private leaseholders, but oyster processors, dealers, distributors, wholesalers, retailers and restaurants as well, not only within the State of Louisiana but including other Gulf States given that Louisiana oysters are processed and distributed widely within the region. The commenter noted that there have been multiple events in the past 10 years that have impacted oyster harvests.

Response:

The LA TIG acknowledges the concern expressed about the need to conduct a socio-economic analysis of potential impacts on the Gulf of Mexico oyster industry from any specific diversion

project considered for construction. These potential impacts were considered and disclosed in the PDARP/PEIS. The SRP/EA did not identify any new or significant impacts. As explained in Section 1, the SRP/EA is a strategic planning document that selects a restoration approach for the Barataria Basin and several restoration projects for further consideration in subsequent Phase II restoration plans and associated NEPA analyses.

Analyses of project-specific impacts, as well as any mitigation, will be evaluated through subsequent Phase II restoration plans and associated NEPA analyses for any specific project being considered for construction.

2. Comment:

A commenter noted that the proposed project and subsequent impact area has a high potential to cause severe economic injury to fishing dependent communities that both fish directly in the vicinity of the impacted area and those that depend on the Barataria Bay as estuary for healthy juvenile aquatic resources, by destroying essential fish habitat in the impacted zones. The commenter noted that the project's intended outcomes are perceived as long-term (decades) but the project will greatly reduce the biodiversity and abundance of vitally important marine resources in the short-term.

The commenter also noted that the proposed MBSD project will have multiple impacts to fisheries that have not been fully evaluated or have been grossly underestimated thus far. These impacts include (A) continual sediment displacement that will smother essential oyster and shrimp habitat; (B) severe changes in water temperature that will directly affect the normal growth of a variety of juvenile marine species; (C) substantial increases in the frequency and duration of hypoxic events that will contribute to an increase in mortality of aquatic resources; (D) elevated levels of PAHs are well documented to exist in the Mississippi River; which could further damage ecosystems if water and sediment are diverted as planned; and (E) the displacement of a variety of commercially important marine resources along with the fishermen who harvest them. The commenter suggested that the analysis must assess the economic impact on local communities, employment, and governments as well as the impact on the cultural fabric of these communities.

A commenter requested that if strategic restoration alternative #1 is chosen by the LA TIG, that serious consideration should be given for direct compensation to the members of the commercial fishing industry that would be impacted by the MBSD project.

Response:

The LA TIG acknowledges the concern expressed that the proposed project has the potential to cause impacts to fish habitat and economic injury to fishing dependent communities. These potential impacts were considered and disclosed in the PDARP/PEIS. The SRP/EA did not identify any new or significant impacts. As explained in Section 1, the SRP/EA is a strategic planning document that selects a restoration approach for the Barataria Basin and several restoration projects for further consideration in subsequent Phase II restoration plans and associated NEPA analyses.

Analyses of project-specific impacts, as well as any mitigation, will be evaluated through subsequent Phase II restoration plans and associated NEPA analyses for any specific project being considered for construction.

7.2.4.12 Other Impacts

1. Comment:

A commenter expressed support for the introduction of freshwater and sediments to deteriorating coastal wetlands, but noted that it must be honestly weighted against the not only possible but probable difficulties. A commenter expressed concerns that these types of sediment diversion are new and untested and there is no guarantee that the proposed MBSD project will create any land at all or within any given time frame. A commenter also mentioned that these types of projects could make wetlands more susceptible to erosion, especially in the event of a hurricane.

Response:

The LA TIG acknowledges that large-scale sediment diversions are a new restoration project type for coastal Louisiana. The LA TIG is committed to a monitoring and adaptive management (MAM) program to evaluate restoration progress and collateral impacts, and conduct adaptive management for the suite of resources targeted by NRDA restoration. Included in monitoring will be indicators of wetland health to assess whether the diversion is increasing wetland susceptibility to erosion.

7.2.5 Comments Regarding Alternative 2: Marsh Creation and Ridge Restoration Plus Shoreline Protection

1. Comment:

A commenter fully supports Shoreline protection projects that would protect coastal wetland habitat through the construction of offshore and/or nearshore breakwaters parallel to the shoreline for the purpose of reducing shoreline erosion.

Response:

The LA TIG appreciates the support for this section of Alternative 2. However, the LA TIG did not select Alternative 2 as the preferred alternative because Alternative 2 is less cost-effective and would have a lower likelihood of long-term success, and a shorter duration and extent of benefits, compared to Alternative 1.

7.2.6 Comments Regarding Alternative 3: Marsh Creation and Ridge Restoration

1. Comment:

Commenters expressed support for Alternative 3: marsh creation and ridge restoration, with one commenter noting that Alternative 3 would have the least impact of the alternatives presented. Commenters also expressed support for the LA TIG's decision to move the Large-Scale Barataria

Marsh Creation - Component E project and the Spanish Pass Increment of the Barataria Basin Ridge and Marsh Creation project forward for further evaluation, planning, and funding at this time.

A commenter asked for consideration of using a combination of dredged material and terracing, as used at the CWPPRA Delta Management Project BS-11, or at the West Bay Diversion (CWPPRA MR-03), noting that this method produces a more ecologically useful landscape than mining sediment from the river and also allows small- to mid-size companies to participate in restoration. A commenter asked whether there could be a cost sharing partnership through the Beneficial Use of Dredge Material (BUDMAT) program to help leverage the most restoration possible in the Spanish Pass area by bringing in material that needs to be removed from the navigation channel of the Mississippi River.

Response:

The LA TIG appreciates the support for Alternative 3 and for the LA TIG's decision to move the Large-Scale Barataria Marsh Creation - Component E project and the Spanish Pass Increment of the Barataria Basin Ridge and Marsh Creation project forward for further evaluation and planning at this time. However, the LA TIG did not select Alternative 3 as the preferred alternative because it is less cost-effective and will provide fewer benefits compared to Alternative 1.

The LA TIG acknowledges the implementation suggestions for marsh creation and ridge restoration projects. These suggestions will be considered as the engineering and design process proceeds for these projects.

7.2.7 Comments Regarding Alternative 4: Natural Recovery – No Action

1. Comment:

A commenter strongly opposes Alternative 4 because it is not consistent with the restoration type (Wetlands, Coastal, and Nearshore Habitats) or restoration approach (Create, Restore, and Enhance Coastal Wetlands).

Response:

The LA TIG agrees that Alternative 4 is not consistent with the selected restoration type or approach for the SRP/EA.

2. Comment:

A commenter recommends LA TIG choose Alternative 4 for the purpose and need of the Strategic Restoration Plan, noting that the LA TIG should analyze and consider the direct and lasting socio-economic impacts this proposed project would have on the seafood industry in developing the draft environmental impact statement for this project.

Response:

The LA TIG disagrees that Alternative 4 can meet the purpose and need for the Plan, noting that Alternative 4 fails to maintain wetlands, coastal and nearshore habitats over time. The potential socio-economic impacts of any specific project considered for construction will be evaluated in subsequent Phase II restoration plans and associated NEPA analyses. The LA TIG has included in their analysis an assessment of the potential socio-economic impacts from the proposed alternative as explained in section 3.2.1.2.7.

7.2.8 Comments Regarding Subsequent Phases and Coordination with U.S. Army Corps of Engineers, Project Implementation, and Timeline

1. Comment:

Commenters expressed support for the LA TIG's cooperation in the MBSD draft Environmental Impact Statement (EIS) process and for a coordinated and comprehensive examination of the environmental impacts of the MBSD that could speed construction of the MBSD project.

Response:

The LA TIG acknowledges and appreciates the support for the LA TIG cooperating in the Army Corps of Engineers' EIS process for the Mid-Barataria Sediment Diversion.

2. Comment:

Commenters suggested the use of conservation easements or servitudes to ensure perpetual protection of the restored wetlands, barrier islands, and coastal areas.

Response:

Where appropriate, the LA TIG will consider mechanisms for long-term protection of restored wetlands, barrier islands, and coastal areas as part of Phase II Restoration Plans and subsequent NEPA analyses for proposed restoration projects.

3. Comment:

A commenter stated that the project cost for engineering and design of restoring marshes ($48.7 million) was unnecessarily high for the project.

Response:

The LA TIG acknowledges the concern about high costs for engineering and design. The estimated cost was developed by CPRA engineers with extensive experience managing the engineering, design, and construction process of coastal restoration projects in Louisiana.

Comment:

Commenters expressed the need for community involvement and collaborative design throughout project implementation, including co-designed and funded adaptation methods that

equitably assess impacts and provide equitable implementation methods. Some commenters provided additional specific suggestions for project implementation, including: flood control (elevating streets or constructing a floodgate), invasive species management, and using Wilkinson Canal as an outflow channel to enable continued access to homes via water.

Response:

The LA TIG appreciates the concerns of stakeholders and homeowners for community involvement in project design and implementation. Potential impacts of restoration projects on flood risk, invasive species management, and community access will be analyzed in subsequent Phase II restoration plans and NEPA analyses, together with any necessary adaptation or mitigation approaches.

4. Comment:

Commenters encouraged the LA TIG to implement alternative 1 swiftly to avoid any further land loss.

Response:

The LA TIG appreciates and acknowledges the need to implement restoration swiftly, given the current rate of habitat loss in Barataria Basin. The LA TIG is working to expedite the restoration planning process.

7.2.9 Comments Regarding Communication with Public, Public Comment Process, and Public Involvement in Project Implementation

1. Comment:

A commenter asked the Trustee Implementation Group to post meeting minutes online, to be in compliance with the LA TIG's standard operating procedures.

Response:

The DWH Trustees issued the Trustee Council Standard Operating Procedures for Implementation of the Natural Resource Restoration for the Deepwater Horizon (DWH) Oil Spill (DWH TC SOPs) to document the expectations of the Trustee Council and each TIG regarding restoration implementation and to promote consistency in restoration planning across the TIGs. The Louisiana TIG is committed to providing regular opportunities for public engagement and awareness consistent with the DWH TC SOPs and applicable state and federal laws and regulations throughout the restoration planning process.

The DWH TC SOPs provide that TIGs will develop meeting minutes for its annual meeting. In compliance with the SOPs, the LA TIG plans to hold a 2018 annual meeting in the upcoming months and will ensure to post those meeting minutes to the Administrative Record.

Since the LA TIG was established, the LA TIG has held several meetings to engage the public in its restoration efforts. The trustees held a public meeting to provide restoration planning and

implementation information during the following occasions: the 2016 and 2017 Trustee Council Annual Meetings (held on September 28, 2016 and November 30, 2017); the October 19, 2016, November 30, 2016, March 15, 2017, and December 13, 2017 CPRA Board Meetings; and the January 24, 2018 meeting on two draft restoration plans (including this draft restoration plan).

2. Comment:

A commenter suggested some degree of integration between the Coastal Protection and Restoration Authority (CPRA) and the NRDA websites, so citizens can view information in a centralized location.

Response:

The LA TIG acknowledges the suggestions to integrate the CPRA and NRDA websites. The LA TIG will take these suggestions into consideration for future restoration planning efforts.

3. Comment:

A commenter requested an extension of the comment period due to language access needs for the Vietnamese-American fishing communities, lack of access to computers, inadequate advance notice for fishing communities, and the complexity of the proposed Restoration Plan.

Response:

The LA TIG considered the comment extension and ultimately did not extend the comment period. While the LA TIG understands the interest in having more time to comment, they favored the public interest in the timely advancement of restoration. The LA TIG believes that a 45-day comment period provided sufficient time for a thorough review of the document and preparation of substantial comments by anyone who chose to make them, while also providing the necessary time for the LA TIG to review and consider all comments and to produce a Final SRP/EA that meets all legal requirements and adequately addresses issues raised by the public.

With particular regard to the Vietnamese-American fishing communities, the LA TIG notes that they engaged translation services, translating the executive summary of the SRP/EA and a fact-sheet into Vietnamese to ensure that the Vietnamese-American fishing community could engage in public comment. In addition, the LA TIG provided translation services at the public hearing on the SRP/EA to ensure real time translation to members of the Vietnamese-American fishing community.

4. Comment:

Commenters urged the TIG to consider the communities and culture of the Barataria Basin while implementing any restoration plan and to use a consensus-driven process. Commenters recommended that the TIG should seek community input, consensus, and support through active engagement and involvement of the public and the agencies and groups that represent them.

Response:

The LA TIG seeks dialogue and public input throughout the restoration planning process from the public, agencies, and groups interested in and affected by coastal restoration. The purpose of restoration, as discussed in the SRP/EA and detailed more fully in the Programmatic Damage Assessment and Restoration Plan/Programmatic Environmental Impact Statement (PDARP/PEIS), is to make the environment and the public whole for injuries resulting from the DWH oil spill by implementing restoration actions intended to return injured natural resources and services to baseline conditions and compensate for interim losses.

The LA TIG notes that the State of Louisiana was involved in an extensive community engagement process associated with development of the 2017 Coastal Master Plan (CMP) (also see response to comment #2 in Section 7.2.3). The SRP/EA included a review of the CMP to evaluate whether some or all of the projects therein could serve as a strategic restoration plan for the basin. Additional opportunities for public review and comment will occur during Phase II restoration planning and the development of the EIS for the Mid-Barataria Sediment Diversion.

5. Comment:

A commenter requested that the First Nations community of Grand Bayou Village be involved with the planning of the Grand Bayou Ridge Restoration component of the plan, so that the ridge restoration project could also become part of a non-structural adaptation program for the community.

Response:

The LA TIG identified the Grand Bayou Ridge Restoration project as one of the example projects that would meet the objectives of the preferred alternative (Alternative 1), if implemented. The LA TIG may choose to move forward with future Phase II restoration plans that incorporate the Grand Bayou Ridge Restoration project, other projects identified in the SRP/EA, or similar restoration projects in the future that would correspond to the preferred alternative. If and when the LA TIG decides to move forward with any of those projects, they intend to engage in a public participation process, consistent with OPA and NEPA, that will welcome participation by the First Nations community.

At this time, the LA TIG proposes selecting the Mid-Barataria Sediment Diversion and one marsh creation increment within Large Scale Marsh Creation - Component E in Barataria Basin for advancement and further evaluation under both OPA and NEPA in Phase II restoration plans and associated NEPA analysis. The LA TIG also confirms their 2017 decision to move the Spanish Pass Increment of the Barataria Basin Ridge and Marsh Creation project forward for further evaluation and planning.

6. Comment:

A commenter proposed that the TIG establish a Gulf Oyster Industry Stakeholder Group for consultation during the project.

Response:

The LA TIG is committed to a transparent restoration planning process for projects selected for further advancement and evaluation through this SRP/EA. The LA TIG will ensure that information is shared with the public, stakeholders, and industry groups in a timely manner related to further NEPA and OPA evaluation for projects selected for further advancement and evaluation through this SRP/EA. The LA TIG seeks a process that provides equal opportunities for engagement and participation from the large variety of public, agency, stakeholder, and industry groups seeking involvement. Because of this need for equal engagement, the LA TIG does not intend to establish a specific oyster industry stakeholder group.

7. Comment:

A commenter offered to support the TIG as they develop future iterations of the restoration plan, specifically with expertise on marine mammals.

Response:

The LA TIG welcomes engagement from the public, agencies, and commissions with specialized expertise relevant to the development of subsequent restoration plans, NEPA review and documentation, and a monitoring and adaptive management program. The LA TIG will consider best available science from all sources as these subsequent efforts are developed.

8.0 List of Preparers and Reviewers

AGENCY/FIRM	NAME	POSITION
STATE OF LOUISIANA		
Coastal Protection and Restoration Authority	Brian Lezina	Coastal Resources Assistant Administrator
Coastal Protection and Restoration Authority	Bradley Barth	Assistant Administrator, Operations Division
Coastal Protection and Restoration Authority	Elizabeth L. Davoli	Coastal Resources Scientist Manager
Coastal Protection and Restoration Authority	Ann Howard	Coastal Resources Scientist Supervisor
Coastal Protection and Restoration Authority	Chris Allen	Coastal Resources Scientist Manager
Coastal Protection and Restoration Authority	Alyson Graugnard	Attorney
Coastal Protection and Restoration Authority	Matt Mumfrey	Attorney
Office of the Governor, Governor's Office of Coastal Activities	Megan Terrell	Legal Advisor, Attorney
Office of the Governor, Governor's Office of Coastal Activities	Chris Barnes	Legal Advisor, Attorney
Plauche and Carr, outside counsel	Billy Plauche	Attorney
Van Ness Feldman, outside counsel	Molly Lawrence	Attorney
Department of Natural Resources	Keith Lovell	Assistant Secretary
Department of Natural Resources	Nicholas LaCroix	Coastal Resources Scientist DCL
Atkins Engineering, Consultant	Luke Le Bas	Senior Division Manager
Atkins Engineering, Consultant	Don Deis	Principal Technical Professional
Atkins Engineering, Consultant	Lisa Mash	Senior Project Manager
Abt Associates, Consultant	Karim Belhadjali	Principal Associate
Abt Associates, Consultant	Diana Lane	Principal Associate
Abt Associates, Consultant	Cameron Wobus	Senior Associate
NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION		
NOAA Restoration Center	Mel Landry	Marine Habitat Resource Specialist
NOAA Restoration Center	Ramona Schreiber	Marine Habitat Resource Specialist
NOAA Restoration Center	Melissa Carle	Marine Habitat Resource Specialist
NOAA Fisheries Southeast Regional Office	Steve Giordano	Ecosystem Restoration and Environmental Compliance Program Manager
U.S. DEPARTMENT OF AGRICULTURE		
Gulf Coast Ecosystem Restoration Team	Ron Howard	Natural Resource Specialist
Gulf Coast Ecosystem Restoration Team	Mark Defley	Biologist
Natural Resources Conservation Service	Ron Boustany	Natural Resource Specialist
U.S. ENVIRONMENTAL PROTECTION AGENCY		
EPA	Raul Gutierrez	Environmental Scientist
EPA	J. Douglas Jacobson	Environmental Protection Specialist
EPA	Michael Jansky	Environmental Engineer
EPA	Danny Wiegand	Environmental Engineer
U.S. DEPARTMENT OF THE INTERIOR		

AGENCY/FIRM	NAME	POSITION
DOI	Robin Renn	DWH NEPA Coordinator
DOI	Kevin Reynolds	Designated Natural Resource Trustee Official – Louisiana Trustee Implementation Group
DOI	John Tirpak	Louisiana Restoration Area Coordinator

9.0 List of Repositories

LIBRARY	ADDRESS	CITY	ZIP
St. Tammany Parish Library	310 W. 21st Avenue	Covington	70433
Terrebonne Parish Library	151 Library Drive	Houma	70360
New Orleans Public Library, Louisiana Division	219 Loyola Avenue	New Orleans	70112
East Baton Rouge Parish Library	7711 Goodwood Boulevard	Baton Rouge	70806
Jefferson Parish Library, East Bank Regional Library	4747 W. Napoleon Avenue	Metairie	70001
Jefferson Parish Library, West Bank Regional Library	2751 Manhattan Boulevard	Harvey	70058
Plaquemines Parish Library	8442 Highway 23	Belle Chasse	70037
St. Bernard Parish Library	1125 E. St. Bernard Highway	Chalmette	70043
St. Martin Parish Library	201 Porter Street	St. Martinville	70582
Alex P. Allain Library	206 Iberia Street	Franklin	70538
Vermillion Parish Library	405 E. St. Victor Street	Abbeville	70510
Martha Sowell Utley Memorial Library	314 St. Mary Street	Thibodaux	70301
South Lafourche Public Library	16241 E. Main Street	Cut Off	70345
Calcasieu Parish Public Library Central Branch	301 W. Claude Street	Lake Charles	70605
Iberia Parish Library	445 E. Main Street	New Iberia	70560
Mark Shirley, LSU Ag Center	1105 West Port Street	Abbeville	70510

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