

***Louisiana Trustee Implementation Group
Draft Phase 2 Restoration
Plan/Environmental Assessment #1.1:
Queen Bess Island Restoration***



December 2018

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Acronyms

BBWW	Barataria Bay Waterway
BMP	best management practice
CEQ	Council on Environmental Quality
CFR	Code of Federal Regulations
Cornell	The Cornell Lab of Ornithology
CPRA	Coastal Protection and Restoration Authority
CWPPRA	Coastal Wetlands Planning, Protection and Restoration Act
CZM Program	Coastal Zone Management Program
DOI	U.S. Department of the Interior
DWH	Deepwater Horizon
E&D	engineering and design
EA	environmental assessment
EFH	essential fish habitat
EO	Executive Order
EPA	U.S. Environmental Protection Agency
ESA	Endangered Species Act
FEMA	Federal Emergency Management Agency
Final PDARP/PEIS	Final Programmatic Damage Assessment and Restoration Plan and Final Programmatic Environmental Impact Statement
GMFMC	Gulf of Mexico Fishery Management Council
La. Admin. Code	Louisiana Administrative Code
LA TIG	Louisiana Trustee Implementation Group
La. Rev. Stat.	Louisiana Revised Statute
LDEQ	Louisiana Department of Environmental Quality
LDNR	Louisiana Department of Natural Resources
LDWF	Louisiana Department of Wildlife and Fisheries
NAAQS	National Ambient Air Quality Standards
NAVD 88	North American Vertical Datum of 1988
NEPA	National Environmental Policy Act
NMFS	National Marine Fisheries Service
NOAA	National Oceanic and Atmospheric Administration
NRCS	Natural Resources Conservation Service
NRDA	Natural Resource Damage Assessment
OPA	Oil Pollution Act of 1990
Phase 1 Final RP	Final Restoration Plan #1
RP	restoration plan
SIP	state implementation plan
TIG	trustee implementation group
USACE	U.S. Army Corps of Engineers
U.S.C.	U.S. Code
USDA	U.S. Department of Agriculture
USFWS	U.S. Fish and Wildlife Service

Section 1

Introduction

The Louisiana Trustee Implementation Group¹ (LA TIG) prepared this draft Phase 2 restoration plan (RP)/environmental assessment (EA) #1.1 for the restoration and conservation of bird habitat in the State of Louisiana as a result of the Deepwater Horizon (DWH) oil spill, which occurred in 2010. During this event, approximately 134 million barrels of oil and other substances were released into the Gulf of Mexico. Many of the coastal islands in the Gulf of Mexico provide important habitat for threatened and endangered bird species and species of concern (e.g., piping plover [*Charadrius melodus*], least tern [*Sternula antillarum*], black skimmer [*Rynchops niger*], American oystercatcher [*Haematopus palliatus*], and brown pelican [*Pelecanus occidentalis*]). The objective of this draft Phase 2 RP/EA #1.1 is to help restore habitat for birds injured by the DWH oil spill by providing suitable colonial waterbird nesting and brood-rearing habitat on Queen Bess Island (**Figure 1-1**).



Figure 1-1
Project Location Map
Queen Bess Island Restoration

The LA TIG prepared this draft Phase 2 RP/EA #1.1 in accordance with the *Deepwater Horizon Oil Spill Final Programmatic Damage Assessment and Restoration Plan and Final Programmatic Environmental Impact Statement (Final PDARP/PEIS)* and record of decision, Oil Pollution Act of 1990 (OPA), and the National Environmental Policy Act of 1969 (NEPA). This draft Phase 2 RP/EA #1.1 describes the DWH oil spill restoration planning process, considers design alternatives for the Queen Bess Island Restoration Project, and identifies a preferred design alternative that would best help

¹The Louisiana Trustee Implementation Group includes five Louisiana state trustee agencies and four federal trustee agencies: Coastal Protection and Restoration Authority (CPRA), Louisiana Department of Natural Resources (LDNR), Louisiana Department of Environmental Quality (LDEQ), Louisiana Oil Spill Coordinator's Office, Louisiana Department of Wildlife and Fisheries (LDWF), National Oceanic and Atmospheric Administration (NOAA), U.S. Department of the Interior (DOI), U.S. Department of Agriculture (USDA), and U.S. Environmental Protection Agency (EPA).

compensate the public for injuries to birds caused by the DWH oil spill in the Louisiana Restoration Area.

Currently, Queen Bess Island has less than 5 acres of suitable nesting and brood-rearing bird habitat (CPRA 2018). Despite its limited size, over 60 species of birds have been reported by citizen scientists on Queen Bess Island (The Cornell Lab of Ornithology [Cornell] 2018), including the brown pelican, which was previously extirpated from Louisiana. The island now supports the third largest and most productive brown pelican rookery in the state and provides critical nesting and brood-rearing habitat for other colonial nesting species (LA TIG 2017b; LDWF 2018). Queen Bess Island was historically divided into three cells over the course of several restoration projects. These cells persist today and contain different wetland habitats due to the different elevations present (Figure 1-2).

1.1 Background

This draft Phase 2 RP/EA #1.1 is based on the LA TIG's selection of projects to fund for engineering and design (E&D) as described and analyzed in the *Louisiana Trustee Implementation Group Final Restoration Plan #1: Restoration of Wetlands, Coastal, and Nearshore Habitats; Habitat Projects on Federally Managed Lands; and Birds* [Phase 1 Final RP] (LA TIG 2017b), pursuant to OPA and is consistent with the Final PDARP/PEIS (DWH Trustees 2016a). These documents are herein incorporated by reference. Links to online versions of these documents are included with their respective citations in Section 9.

The Final PDARP/PEIS sets forth the process for DWH restoration planning to select specific projects for implementation and establishes a distributed governance structure that assigns a trustee implementation group (TIG) for each of eight Restoration Areas. The LA TIG makes all restoration decisions for the funding allocated to the Louisiana Restoration Area. The Final PDARP/PEIS also outlines provisions for TIGs to phase restoration projects across multiple restoration plans. For example, a TIG may propose funding a planning phase (e.g., initial engineering, design, and compliance) in one plan for a conceptual project. This would allow the TIG to develop information needed to fully consider a subsequent implementation phase of that project in a future restoration plan. The LA TIG prepared the Phase 1 Final RP as a first-phase



Figure 1-2
Cell Identification Map
Queen Bess Island Restoration

plan, selecting project alternatives² to undergo a second phase for E&D. The Queen Bess Island Restoration Project was selected as a project alternative in the Phase 1 Final RP to be funded for E&D. The Queen Bess Island Restoration Project E&D is at a stage where enough information has been developed to conduct a meaningful NEPA analysis.

In selecting projects for the Phase 1 Final RP, the LA TIG considered:

- OPA screening criteria
- Restoration goals and other criteria identified by the Trustees in the Final PDARP/PEIS (DWH Trustees 2016a)
- Contents of Louisiana’s Comprehensive Master Plan for a Sustainable Coast from 2012 (CPRA 2012)
- The need to provide restoration benefits across the many Louisiana basins impacted by the DWH oil spill
- Input from the public
- Current and future availability of funds under the DWH oil spill Natural Resource Damage Assessment (NRDA) settlement payment schedule

The Phase 1 Final RP describes the DWH NRDA restoration planning process, identifies a reasonable range of restoration project alternatives to continue to address injuries to resources and habitats caused by the DWH oil spill, and selects from those alternatives a suite of restoration alternatives on which the LA TIG will conduct E&D. As project alternatives were analyzed in the Phase 1 Final RP, only design alternatives² are analyzed in this Phase 2 RP/EA #1.1.

1.2 OPA and NEPA Compliance

As an oil pollution incident, the DWH oil spill is subject to the provisions of OPA (33 United States Code [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 an incident involving an oil discharge or substantial threat of an oil discharge. Federal trustees must comply with NEPA, 42 U.S.C. § 4321 et seq., its regulations, 40 Code of Federal Regulations (CFR) § 1500 et seq., and agency-specific NEPA regulations when planning restoration projects.

DOI is the lead federal trustee for preparing this draft Phase 2 RP/EA #1.1 pursuant to NEPA. The federal and state agencies of the LA TIG are acting as cooperating agencies for the purposes of compliance with NEPA in the development of this RP/EA. For the draft Phase 2 RP/EA #1.1, each federal cooperating agency on the LA TIG intends to adopt the NEPA analysis, which tiers from the Final PDARP/PEIS where appropriate.

1.3 Purpose and Need

To meet the purpose of restoring those natural resources and services injured as a result of the DWH oil spill, the LA TIG proposes to implement the Preferred Alternative as described in this draft Phase 2 RP/EA #1.1. The draft Phase 2 RP/EA #1.1 is consistent with the Final PDARP/PEIS (DWH Trustees 2016a), which identifies extensive and complex injuries to natural resources and

² Project alternatives are independent restoration projects that could be selected and implemented to address injuries as a result of the DWH oil spill. The word “project” and “project alternative” may be used interchangeably in this document. Design alternatives are different configurations of potential designs for a given project alternative that are analyzed and evaluated. After analysis, a “Preferred Alternative” is selected from the design alternatives and carried forward with a “Non-preferred Alternative” for OPA and National Environmental Policy Act analysis.

services across the Gulf of Mexico as well as a need and plan for comprehensive restoration consistent with OPA.

As described in Section 5.3 of the Final PDARP/PEIS, the five programmatic goals for restoration work independently and together to benefit injured resources and services. The programmatic goal addressed in this draft Phase 2 RP/EA #1.1 is to replenish and protect living coastal and marine resources.

Consistent with the programmatic goals, the Trustees also developed goals for each restoration type (Final PDARP/PEIS Sections 5.5.2 through 5.5.14 [DWH Trustees 2016a]). These specific goals help to guide restoration planning and project selection for each restoration type. This draft Phase 2 RP/EA #1.1 addresses the “bird” restoration type (Final PDARP/PEIS Section 5.5.12.1). For injuries to birds resulting from the DWH oil spill, restoration goals are as follows:

- Restore bird populations by facilitating additional production and/or reduced mortality of injured bird species
- Restore or protect habitats on which injured birds rely
- Restore injured birds by species where actions would provide the greatest benefits within geographic ranges that include the Gulf of Mexico

To help meet these goals, habitat restoration is needed. Additional information about the purpose and need for DWH NRDA restoration can be found in Section 5.3.2 of the Final PDARP/PEIS on page 5-11 (DWH Trustees 2016a).

Proposed Action

The LA TIG addresses the above restoration goals by proposing implementation of the Queen Bess Island Restoration Project Design Alternative 2B: Sloping Southwest to Northeast (Design Alternative 2B) as the Preferred Alternative, using funds made available in the DWH Consent Decree. Design Alternative 2B focuses on filling the existing open water (Cell 3) and sloping the fill material from west to east in Cells, 1, 2, and 3 (**Figure 3-1**). See Section 3.1 for design details.

Design Alternative 2B Development

In the early stages of E&D, Design Alternative 2A (described in Section 3.1.2) was under consideration as the Preferred Alternative. However, during the preliminary design, agency input from NOAA led to design changes that would avoid and minimize impacts to essential fish habitat³ (EFH). Therefore, the original design (Design Alternative 2A) was modified by lowering the target elevation so the fill would settle to the high end of the intertidal range sooner and adding a tidal exchange point within Cell 1. This modified design (Design Alternative 2B) is carried forward as the Preferred Alternative, and the original design alternative (2A) is carried forward as the Non-preferred Alternative. A No Action Alternative is also analyzed. The estimated total project cost for Design Alternative 2B is \$18,710,000.00. This includes an estimated \$2 million in E&D expended in line with the Phase 1 Final RP, and an additional \$16,710,00.00 being sought here for construction, construction oversight, operations, maintenance, monitoring, adaptive management, and any future engineering and design costs.

³ EFH is habitat necessary for managed fish species to complete their life cycle.

1.4 Public Involvement

Public input is an integral part of NEPA, OPA, and the DWH oil spill restoration planning effort. On October 1, 2010, the Trustees published a Notice of Intent to Conduct Restoration Planning (75 Federal Register 60800). Since then, the Trustees have sought restoration project ideas from the public through a variety of means. In addition, the Trustees conducted an extensive public outreach process as part of Final PDARP/PEIS development efforts; that process and associated public comments are described more fully in Chapter 8 of the Final PDARP/PEIS (DWH Trustees 2016a). The Trustees also solicited public review and comment on several draft DWH restoration plan/environmental reviews. Additional public participation opportunities associated with this draft Phase 2 RP/EA #1.1 are identified below.

1.4.1 Public Review and Comment Opportunity for this draft Phase 2 RP/EA #1.1

On June 22, 2018, the LA TIG posted a Notice of Intent on the NOAA Gulf Spill Restoration website (<https://www.gulfspillrestoration.noaa.gov/>), informing the public that it was beginning to draft a restoration plan to restore suitable colonial waterbird nesting and brood-rearing habitat on coastal islands. The public is encouraged to review and comment on this draft Phase 2 RP/EA #1.1 made available for public review and comment for 30 days following release as specified in the public notice published in the Federal and Louisiana Registers. Comments can be submitted during the comment period by one of following methods:

- Via the internet: <http://www.gulfspillrestoration.noaa.gov/restoration-areas/louisiana>
- Via hard copy, write: U.S. Fish and Wildlife Service, P.O. Box 49567, Atlanta, GA 30345

Submissions must be postmarked no later than 30 days after the release date of the draft Phase 2 RP/EA #1.1. To facilitate public comment, a public meeting is scheduled for January 3, 2019, in Baton Rouge.

Next Steps

As noted above, the LA TIG will accept public comments and host a public meeting to facilitate the public review and comment process for the Queen Bess Restoration Project design alternatives proposed in this draft Phase 2 RP/EA #1.1. After the close of the public comment period, the LA TIG will consider all input received during the public comment period and finalize the Phase 2 RP/EA #1.1. A summary of comments received and the LA TIG's responses (where applicable) will be included in the final Phase 2 RP/EA #1.1. Following public review, the LA TIG will select a design alternative and prepare for implementation, including final design and construction. If appropriate, DOI will prepare a finding of no significant impact document that will be included in the final Phase 2 RP/EA # 1.1, which will be made available to the public.

1.5 Decisions to be Made

This document is intended to provide the public and decision makers with information and analysis on the LA TIG's proposal to proceed with the selection and implementation of a preferred design alternative for the Queen Bess Island Restoration Project. The environmental impacts of the selected design alternative are assessed in this document. This RP/EA and the corresponding opportunity for the public to review and comment on the document are intended to guide the LA TIG's selection of projects for implementation that best meet its purpose and need as described in Section 1.3 above.

Section 2

Restoration Planning Process: *Project Screening and Alternatives*

2.1 Restoration Planning Process

Immediately following the DWH oil spill, the Trustees initiated an injury assessment pursuant to OPA, which established the nature, degree, and extent of injuries from the DWH incident to both natural resources and the services they provide. The Trustees then used the results of the injury assessment to inform restoration planning so that restoration can address the nature, degree, and extent of the injuries caused by the DWH oil spill. As a programmatic restoration plan, the Final PDARP/PEIS provides direction and guidance for identifying, evaluating, and selecting future restoration projects to be carried out by the TIGs (Final PDARP/PEIS Chapter 7 and Section 5.10.4 [DWH Trustees 2016a]). The Trustees documented large-scale and pervasive bird injuries in the northern Gulf of Mexico as a result of the DWH oil spill (DWH Trustees 2016a). Given the extensive injuries to birds and their various habitats in Louisiana, the LA TIG decided to prioritize in the Phase 1 Final RP projects that would restore for birds injured by the DWH oil spill.

2.1.1 Phase 1 Final RP

Consistent with the 13 restoration types described in the Final PDARP/PEIS (DWH Trustees 2016a), in the Phase 1 Final RP, the LA TIG decided to address three: Wetlands, Coastal, and Nearshore Habitats; Habitat Projects on Federally Managed Lands; and Birds. The Phase 1 Final RP analyzed a reasonable range of project alternatives anticipated to meet the restoration goals for each of the three restoration types. In addition to the OPA standards, the LA TIG established and applied additional incident-specific evaluation and selection criteria (Phase 1 Final RP Section 2.2.1.3 [LA TIG 2017b]).

In the Phase 1 Final RP, the LA TIG screened project alternatives at the conceptual design stage that could provide suitable colonial waterbird habitat on coastal islands based on geographic location, immediacy, and sustainability of project benefits provided to the resources injured. Through this analysis, the LA TIG narrowed the range of alternatives down to a suite of projects consistent with the restoration goals identified in the Final PDARP/PEIS:

- Pass-a-Loutre Restoration
- New Harbor Island
- Queen Bess Island
- Cat Island/Mangrove Island
- Rabbit Island
- Shoreline Protection at Jean Lafitte National Historical Park and Preserve
- New Orleans East Land Bridge Marsh Creation
- Lake Borgne Marsh Creation
- Barataria Basin Ridge and Marsh Creation
- Terrebonne Basin Ridge and Marsh Creation

- Mid-Barataria Sediment Diversion
- Raccoon Island
- Wine Island
- Freshwater Bayou Shoreline Protection

Of the 14 project alternatives fully evaluated according to OPA, the LA TIG selected 6 to undergo further E&D development:

- Rabbit Island Restoration Project
- Queen Bess Island Restoration Project
- Lake Borgne Marsh Creation: Increment 1
- Barataria Basin Ridge and Marsh Creation: Spanish Pass Increment
- Terrebonne Basin Ridge and Marsh Creation: Bayou Terrebonne Increment
- Shoreline Protection at Jean Lafitte National Historical Park and Preserve

Section 2.2 of the Phase 1 Final RP describes the screening and evaluation process used to select projects for inclusion in Phase 2 restoration plans. The six selected project alternatives, including Queen Bess Island, were carried forward to E&D during which design alternatives were further developed. Screening of the project alternatives adheres to project selection criteria consistent with OPA regulations (15 CFR § 990.54), the Final PDARP/PEIS, and additional evaluation criteria established by the LA TIG (Phase 1 Final RP Section 2.2.1 [LA TIG 2017b]). The OPA evaluation for the Queen Bess Island Restoration Project is herein incorporated by reference and can be found in Section 2.2.2.3.1 of the Phase 1 Final RP [LA TIG 2017b]. Design alternatives are further analyzed below.

2.1.2 Draft Phase 2 RP/EA #1.1

The Queen Bess Island Restoration Project is currently at a stage in the E&D process (30 percent design) where information is sufficient to conduct meaningful OPA and NEPA analysis on the reasonable range of design alternatives. Therefore, the LA TIG initiated preparation of this draft Phase 2 RP/EA #1.1. As the other five selected projects progress through E&D, additional Phase 2 restoration plans are expected to be initiated for those projects at a later time.

2.2 OPA Evaluation of Design Alternatives

2.2.1 Queen Bess Island Design Alternatives

During conceptual and preliminary design, design alternatives were developed and evaluated as documented in the *Queen Bess Island Restoration Project (BA-0202) Conceptual Design Report* (CPRA 2018) incorporated herein by reference. The LA TIG applied each of the OPA evaluation standards (15 CFR § 990.54) to these design alternatives to affirm consistency with initial OPA evaluation completed in the Phase 1 RP and determine how well each meets the elements below. The OPA evaluation criteria include:

- The cost to carry out the design alternative
- The extent to which each design alternative is expected to meet the LA TIG's goals and objectives in returning the injured natural resources and services to baseline and/or compensating for interim losses
- The likelihood of success of each design alternative

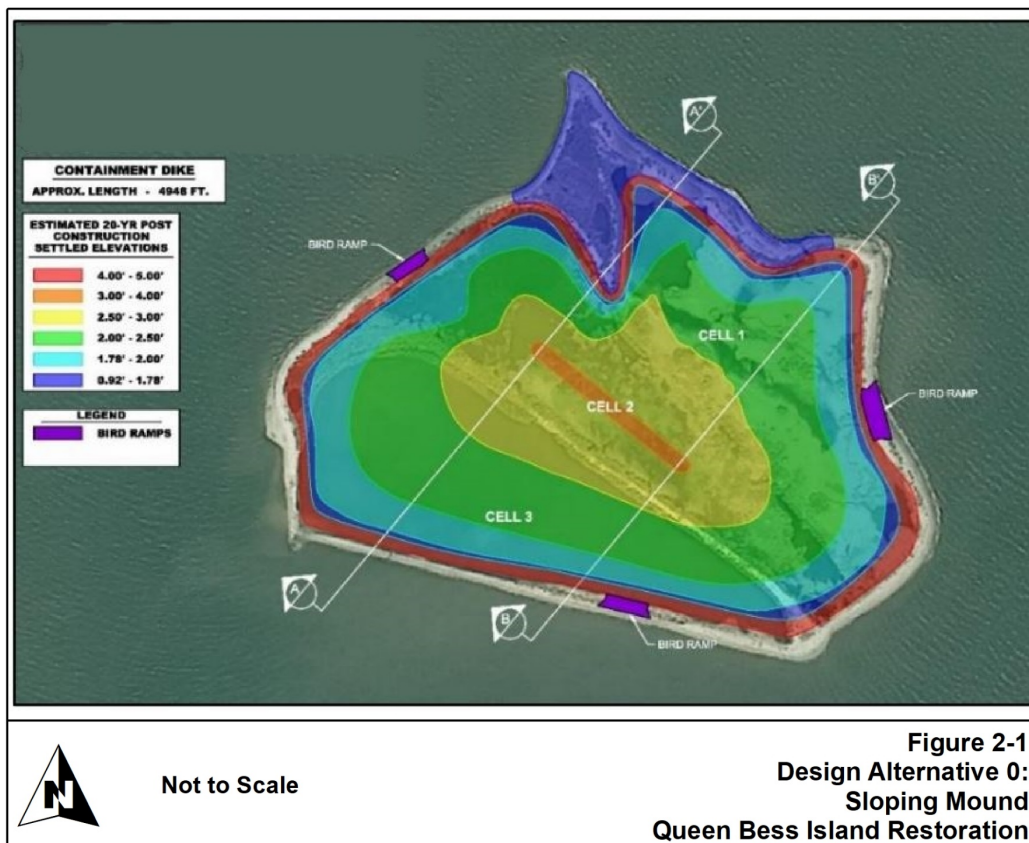
- The extent to which each design alternative would prevent future injury as a result of the incident and avoid collateral injury as a result of implementing the alternative
- The extent to which each design alternative benefits more than one natural resource and/or service
- The effect of each design alternative on public health and safety

Of the six design alternatives that were initially developed, one (Design Alternative 1: Tabletop Marsh) was eliminated from further consideration due to the risk of ponding that could be detrimental (e.g., nest flooding, increase in disease transmission) to nesting colonial waterbirds. Therefore, five design alternatives were carried forward for consideration and evaluation.

A brief description of the five design alternatives considered follows. A complete description can be found in the *Queen Bess Island Restoration Project (BA-0202) Conceptual Design Report (CPRA 2018)*. All of the design alternatives refer to design features that would occur in the existing cells of Queen Bess Island. Following the descriptions, **Table 2-1** summarizes OPA screening of the five design alternatives.

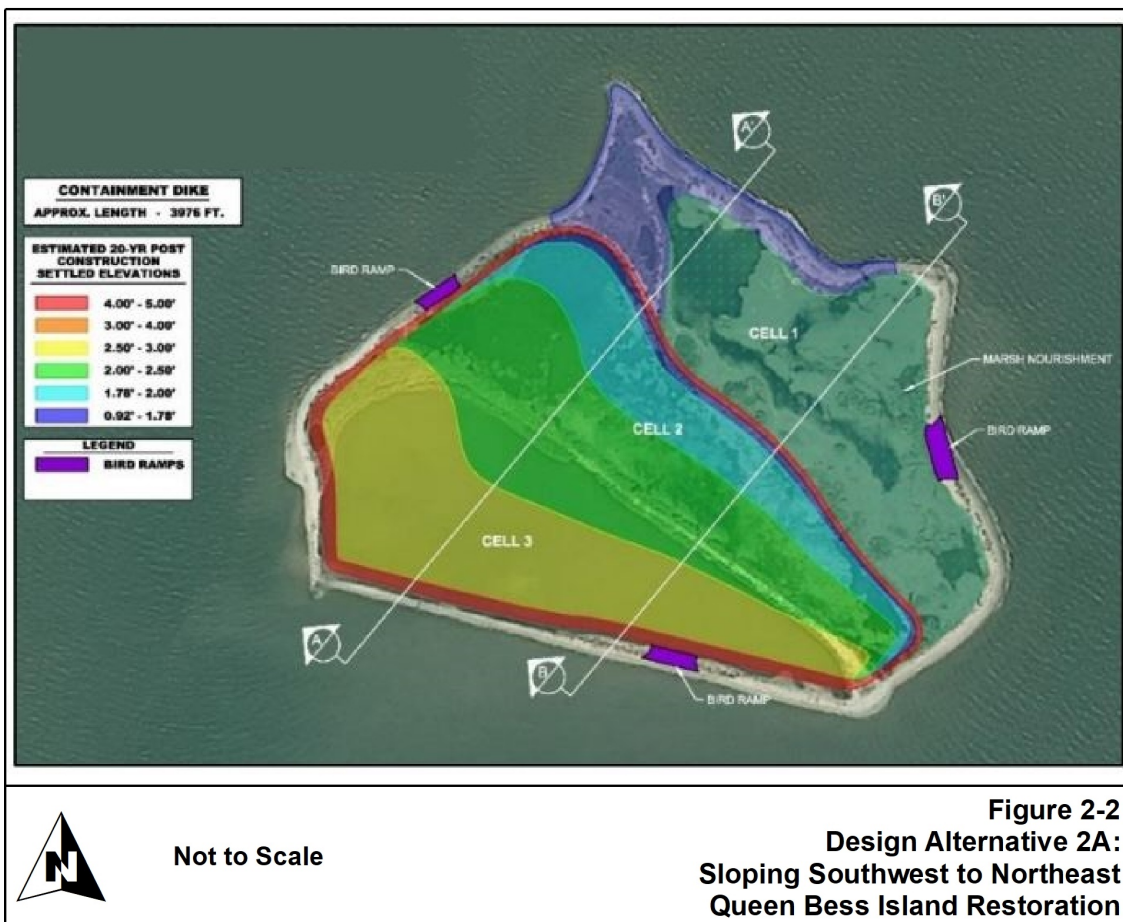
Design Alternative 0: Sloping Mound

This design provided a mound of dredged material located at the island's center for nesting brown pelicans and wading birds (**Figure 2-1**). A small limestone feature that wraps around the island's perimeter was included in this conceptual design to create a low maintenance beach-like feature for nesting terns and skimmers. This design alternative would create 33 acres of brown pelican habitat and 4 acres of tern and skimmer habitat.



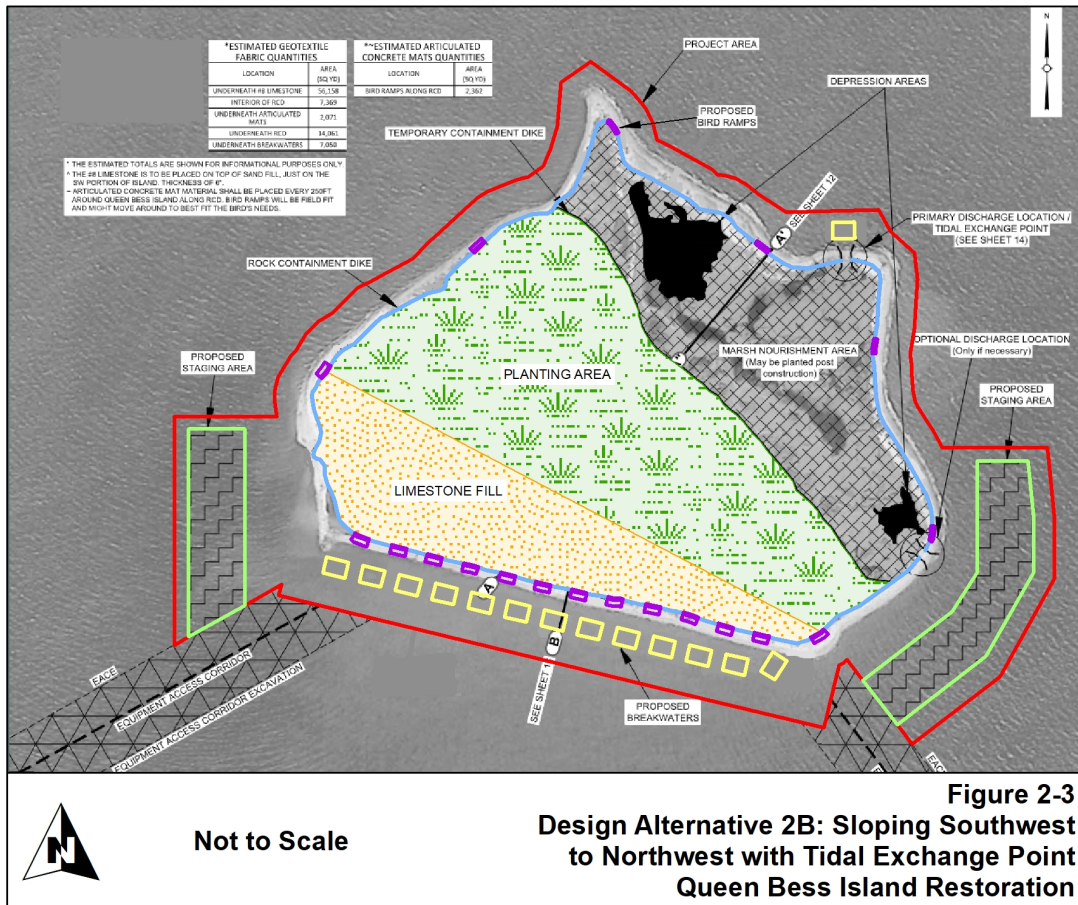
Design Alternative 2A: Sloping Southwest to Northeast

This design included filling the existing open water cell (Cell 3), gradually sloping fill material through Cell 2 from west to east, and concluding with marsh nourishment in Cell 1 (**Figure 2-2**). The marsh nourishment in Cell 1 would settle to an intertidal elevation within the first 5 years after construction. A 6-inch layer of crushed limestone would be placed over geotextile fabric within approximately 7 acres of Cell 3 to reduce the potential for vegetation growth. This would provide dedicated tern and skimmer nesting and brood-rearing habitat and also allow for a variety of vegetation growth and nesting substrate options for colonial waterbirds, with areas supporting marsh shrub growth in Cells 2 and 3 and black mangrove (*Avicennia germinans*) and marsh grasses in Cell 1. This design included up to 21 bird ramps placed approximately every 250 feet to facilitate young birds' access around the island. Bird ramps are sloping features that connect upland habitat with open water habitat and allow birds to move between these habitats. This design alternative would create 30 acres of brown pelican habitat and 7 acres of tern and skimmer habitat.



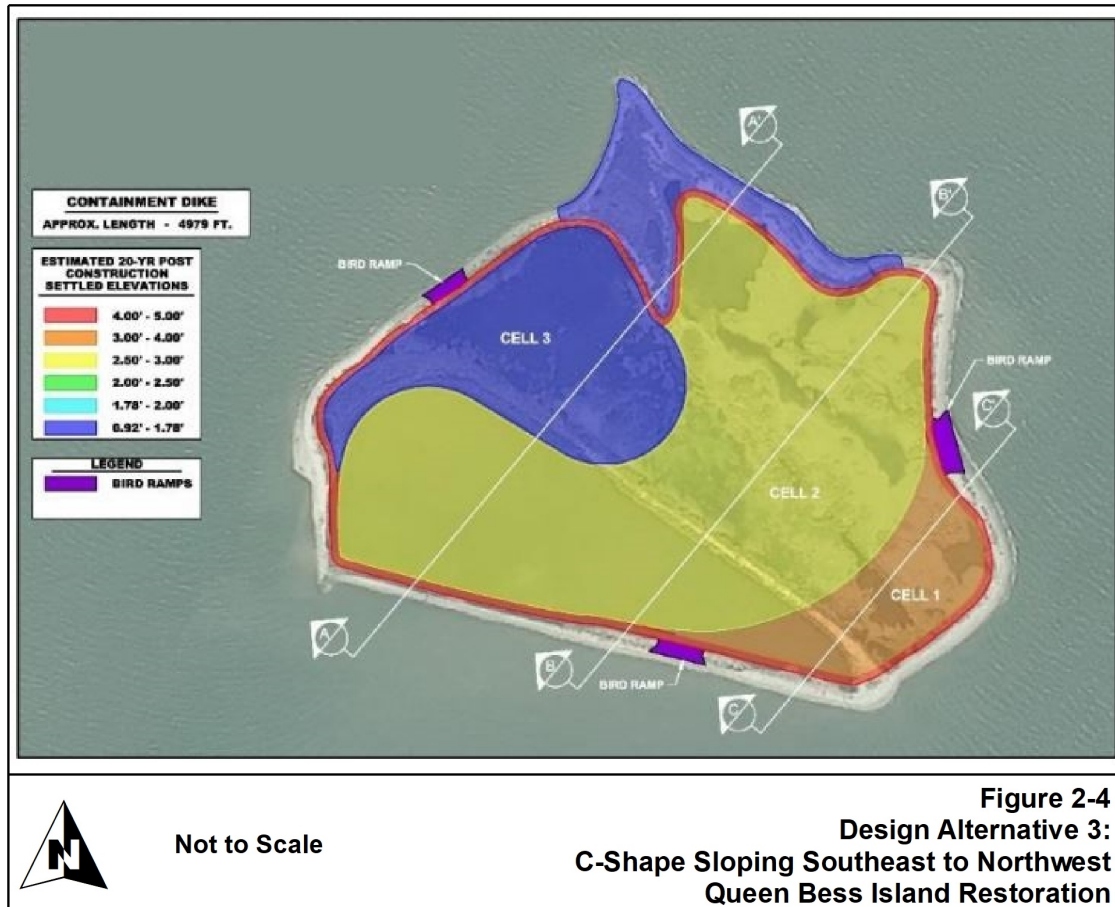
Design Alternative 2B: Sloping Southwest to Northeast with Tidal Exchange Point

During the preliminary design, agency input from NOAA led to design changes that would avoid and minimize impacts to EFH. This design would be similar to Design Alternative 2A but with lower initial fill elevations in Cell 1, which would settle to intertidal elevations within the first year. Additionally, a tidal exchange point would be created in Cell 1 (**Figure 2-3**). Similar to Design Alternative 2A, this design alternative would create 30 acres of brown pelican habitat and 7 acres of tern and skimmer habitat.



Design Alternative 3: C-Shape Sloping Southeast to Northwest

This design alternative would create three marsh platforms at different elevations, sloping from southeast to northwest, forming a c-shape (**Figure 2-4**). This design feature would mimic a traditional barrier island shape, with the southern edge reinforced from the nominal wind field by having a dune feature located directly behind it. This design alternative would create 28 acres of brown pelican habitat and 9 acres of tern and skimmer habitat.



Design Alternative 4: Two-Phase Construction

This design alternative provided for two phases of construction. The first phase, similar to Design Alternative 2A, would fill Cell 3, sloping to Cell 2, and provide marsh nourishment in Cell 1 (Figure 2-5). The second phase would implement a second marsh nourishment within Cell 1 and create a smaller marsh dune platform and a reinforced barrier on the southeastern side of the island. This second phase would be conducted approximately 1 year later in conjunction with the West Grand Terre Project as a way to reduce project costs of the second phase and allow for settling of the fill placed during the first phase. This design alternative would create 28 acres of brown pelican habitat and 9 acres of tern and skimmer habitat.



Not to Scale

Figure 2-5
Design Alternative 4:
Two-Phase Construction
Queen Bess Island Restoration

Table 2-1. OPA Evaluation Summary for Design Alternatives

Design Alternatives Considered	OPA Screening
<p>Design Alternative 0: Sloping Mound</p> <p>Design Alternative 2A: Sloping Southwest to Northeast</p> <p>Design Alternative 2B: Sloping Southwest to Northeast with Tidal Exchange Point</p> <p>Design Alternative 3: C-Shape Sloping Southeast to Northwest</p> <p>Design Alternative 4: Two-Phase Construction</p>	<p><i>Cost-effectiveness:</i> Conceptual costs were developed at the start of the E&D phase. Design Alternative 2A was the most cost-effective (approximately \$8.1 million), followed by Design Alternative 0 (approximately \$9.6 million) and Design Alternative 3 (approximately \$9.9 million). The least cost-effective option was Design Alternative 4 (approximately \$11.1 million). These conceptual costs included construction and implementation costs such as dike elevation and sand placement. After further design refinement, Design Alternative 2A was modified into the Preferred Alternative (Alternative 2B). Design Alternative 2B requires less sand fill than Design Alternative 2A, making it more cost-effective than Design Alternative 2A.</p> <p><i>Goals and objectives:</i> All design alternatives would be consistent with the Phase 1 Final RP evaluation for the Queen Bess Island Restoration Project to meet the “replenish and protect living coastal and marine resources” goal by addressing the birds restoration type.</p> <p><i>Likelihood of success:</i> All design alternatives are likely to succeed as they are technically feasible and utilize proven and established restoration methods used by other projects in the region (i.e., Coastal Wetlands Planning, Protection and Restoration Act [CWPPRA] projects).</p> <p><i>Avoid collateral injury:</i> During the preliminary design, agency input from NOAA led to design changes to Design Alternative 2A that would avoid and minimize impacts to EFH. The modified design (Design Alternative 2B) would impact EFH less than other design alternatives. For all design alternatives during implementation, best management practices (BMPs) would be employed, and activities would be conducted according to any conditions arising from consultations and permitting to avoid and minimize collateral injury to natural resources.</p> <p><i>Benefits:</i> All design alternatives would provide a primary benefit of improvement to colonial waterbird habitat for foraging and breeding. All design alternatives would provide benefits to a range of bird species that utilize the habitat.</p> <p><i>Health and safety:</i> The LA TIG does not anticipate impacts to public health and safety from implementing any of the design alternatives. Queen Bess Island is uninhabited, remote, and accessible only by boat. During construction, all laws and regulations pertaining to worker safety would be followed.</p> <p><i>Summary:</i> All Queen Bess Island design alternatives meet the OPA standards and LA TIG objectives. However, based on OPA evaluation criteria of cost-effectiveness and avoidance of collateral injury, Design Alternative 2B was determined to best meet all criteria and is determined to be the preferred design alternative.</p>

2.2.2 Natural Recovery

Pursuant to the OPA regulations, the Final PDARP/PEIS considered “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]). Under a natural recovery alternative, no additional restoration would be done by the LA TIG to accelerate the recovery of birds in the Louisiana restoration area using DWH NRDA funding at this time. The LA TIG would allow natural recovery processes to occur, which could result in one of four outcomes for injured resources: (1) gradual recovery, (2) partial recovery, (3) no recovery, or (4) further deterioration. Although injured resources could presumably recover to or near baseline conditions under this scenario, recovery would take much longer compared to a scenario in which restoration actions were undertaken. Given that technically feasible restoration approaches are available to compensate for interim natural resource and service losses, the DWH Trustees rejected this alternative from further OPA evaluation within the Final PDARP/PEIS (DWH Trustees 2016a). Based on this

determination and incorporating that analysis by reference, the LA TIG did not evaluate natural recovery as a viable alternative under OPA.

2.2.3 Conclusion

The LA TIG has completed its OPA screening and determined that all but one (Design Alternative 1) of the six Queen Bess Island design alternatives meet the Queen Bess Island Restoration Project objectives and OPA screening criteria. Some meet those criteria better than others, as described in **Table 2-1**. Although five design alternatives meet the minimum OPA standards, Design Alternatives 2A and 2B best meet the Queen Bess Island Restoration Project objectives and were chosen as the reasonable range to carry forward for further OPA evaluation and NEPA analysis.

Section 3

Reasonable Range of Alternatives

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). As described in Section 2.2, the five Queen Bess design alternatives meet the OPA NRDA regulatory criteria. A thorough and comprehensive evaluation was conducted to uniformly and objectively assess these design alternatives (CPRA 2018).

For the Queen Bess Island Restoration Project, Design Alternative 2A was originally carried forward in the conceptual design report as the Preferred Alternative because it provided similar benefits but had no major constructability issues compared to other design alternatives, was constructible within one non-nesting season, and included raising the existing rock dike so that habitats are protected and contained throughout the project life. During the preliminary design, agency input from NOAA led to design changes that would avoid and minimize impacts to EFH. These changes included lower initial elevations and a tidal exchange point in Cell 1. The modified design was then carried forward as the Preferred Alternative (Design Alternative 2B) in this draft Phase 2 RP/EA #1.1, and Design Alternative 2A without the tidal exchange point was carried forward as the Non-preferred Alternative.

A reasonable range of alternatives was carried forward from the OPA evaluation. These design alternatives are described below. The LA TIG applied each of the OPA NRDA criteria to the reasonable range of alternatives in this section to provide a summary explanation of the types of questions and analysis raised under each of the OPA NRDA criteria and a narrative summary of each evaluation with respect to those criteria.

3.1 Queen Bess Island Restoration Project

3.1.1 Design Alternative 2B – Preferred Alternative

Design Alternative 2B would create 30 acres of brown pelican habitat and 7 acres of tern and skimmer habitat. This would be accomplished by filling the existing open water cell (Cell 3) and gradually sloping fill material through Cell 2 from west to east (**Figure 3-1**). A summary of construction elevations and vegetative cover is shown on **Table 3-1**. Fill material would come from an approved quarry or sand pit. CPRA would require the contractor to provide proof that the purchased fill material was dredged from inland, freshwater areas, outside the range of Endangered Species Act- (ESA-) listed species under National Marine Fisheries Service's (NMFS's) jurisdiction. If this is not the case, and the dredging occurred in areas within those species' range, the contractor would be required to provide proof that U.S. Army Corps of Engineers (USACE) has already completed Section 7 consultation under the ESA on the effects of the proposed dredging. The material would be loaded off-site and barged to Queen Bess Island via the Barataria Bay Waterway (BBWW) (**Figure 3-2**). This would allow for the selection of a variety of good quality fill material. Because the fill material is sand, settling should occur quickly, and higher construction elevations would be easier to achieve than with finer sediment.

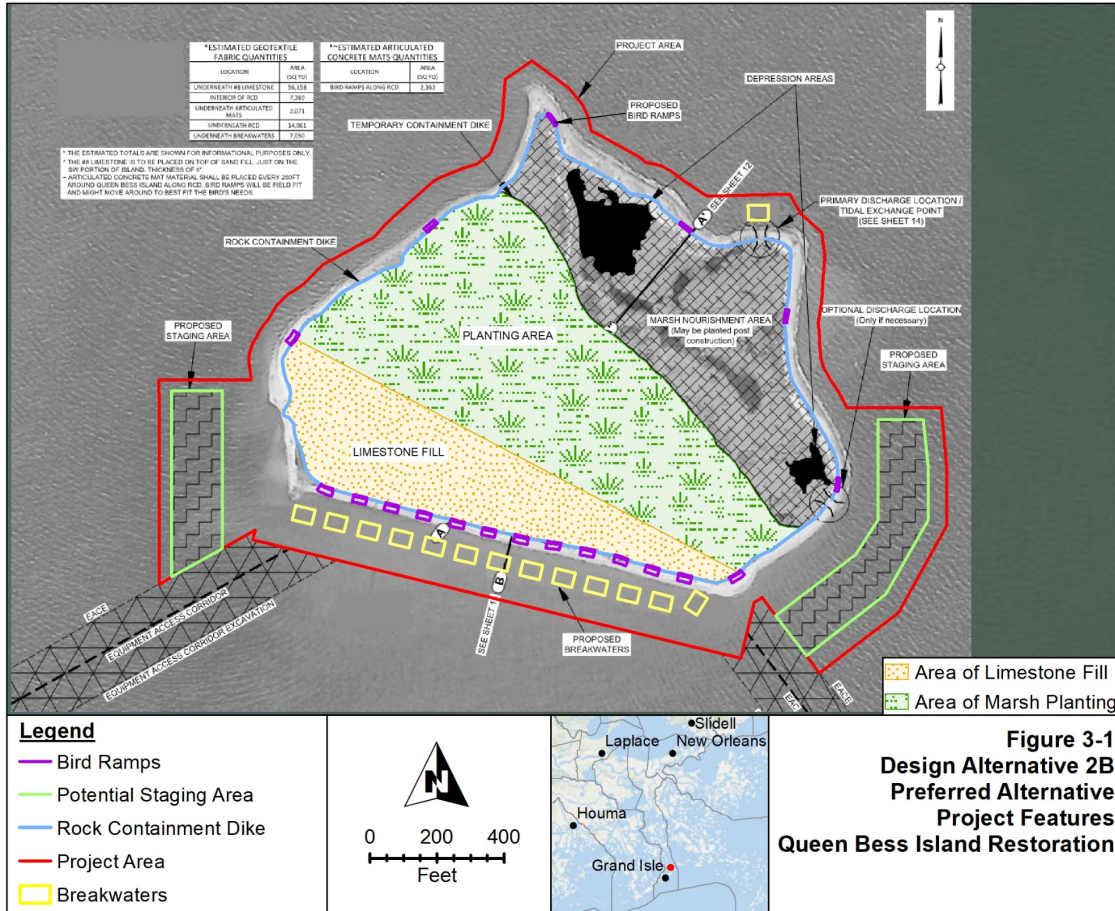


Table 3-1. Design Alternative 2B – Preferred Alternative Cell Construction Elevations and Vegetation Summary

Cell	Construction Elevation (feet NAVD 88)	Five-Year Settled Elevation (feet NAVD 88)	Cover/Vegetation	Management
1	1.5	Not Available (1.0 feet within the first year)	Natural revegetation and recruitment with plantings	Invasive vegetation to be controlled by LDWF, as needed.
2	2.5 to 3.75	2.0 to 2.5	Planted or hydroseeded with marsh elder (<i>Iva frutescens</i>) or groundsel bush (<i>Baccharis halimifolia</i>) and matrimony vine (<i>Lycium carolinianum</i>)	Invasive vegetation to be controlled by LDWF, as needed. Potential options to address this uncertainty include, but are not limited to, utilization of chemical, mechanical, or other removal techniques.
3	3.75 to 5.0	2.5 to 3.5	Six-inch crushed limestone layer (~7-acre footprint) with remainder of cell planted or hydroseeded with marsh elder or groundsel bush	Vegetation to be controlled by LDWF, as needed.

NAVD 88 – North American Vertical Datum of 1988



The marsh nourishment would occur in Cell 1, which would leave this cell immediately available for colonial waterbird nesting and brood-rearing habitat following construction. In Cell 3, an approximately 7-acre elevated platform of crushed limestone (6 inches deep) would be created for nesting terns and skimmers. Limestone would be placed over geotextile fabric to reduce potential for vegetation growth. Additionally, herbicide application of imazapyr and glyphosate would be applied in the spring (prior to bird nesting season) and fall (after the conclusion of the bird nesting season) to maintain optimal tern and skimmer habitat. The Preferred Alternative allows for a variety of vegetation growth and nesting substrate options for colonial waterbirds, including an upland, unvegetated platform in Cell 3, areas supporting marsh shrub growth in

Cells 2 and 3, and black mangrove and marsh grasses in Cell 1. Plantings of appropriate native vegetation species would occur within all cells. Breakwaters would be installed on the island's northeast side to reduce potential scour associated with the tidal exchange point and the southwest side to dissipate wave energy, which would provide young colonial waterbirds with a calm water environment. Cell 1 would reach elevations within the higher intertidal range during approximately the first 2 years of the project lifespan. A tidal exchange point would be created in Cell 1 to promote or enhance fish access in this cell.

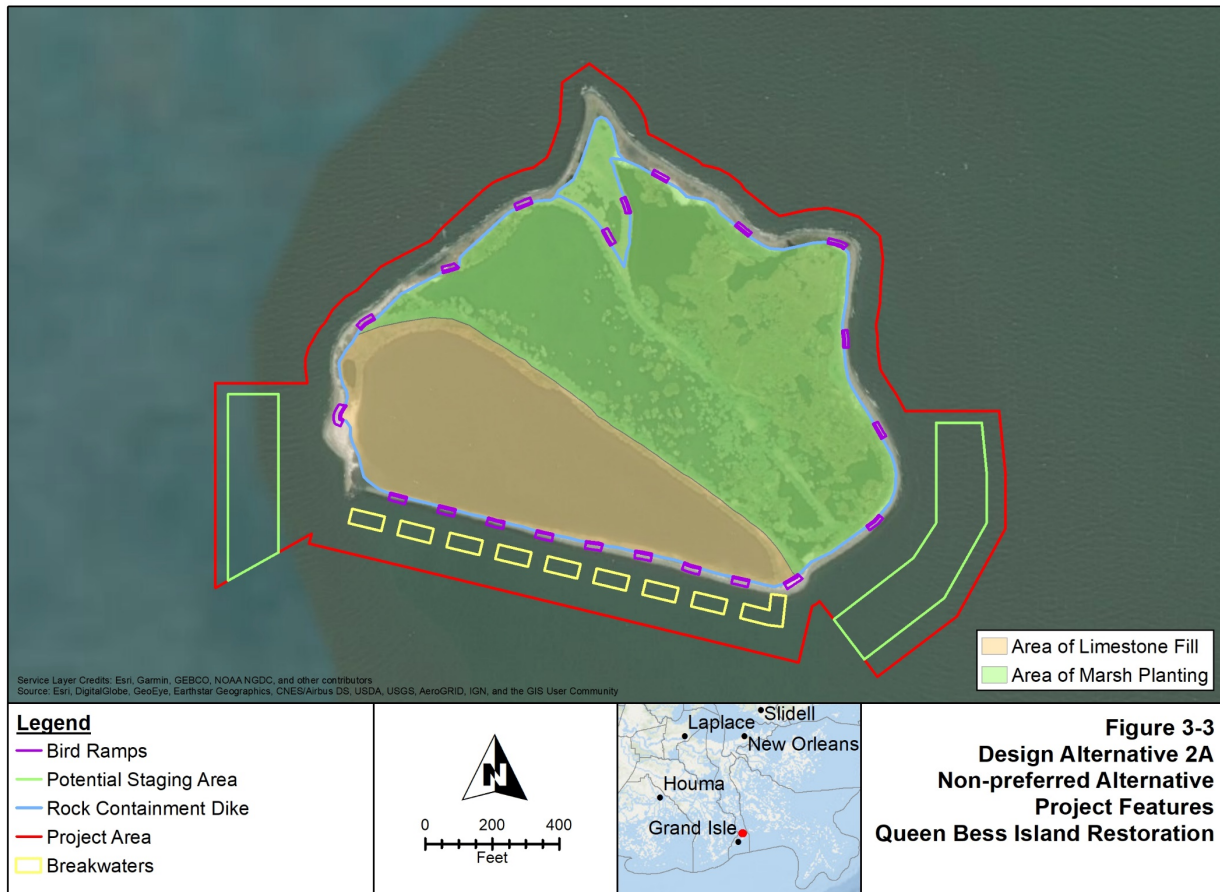
Design Alternative 2B includes up to 21 bird ramps placed approximately every 250 feet at an approximate 3:1 slope to facilitate young birds' access to water around the island (**Figure 3-1**). The final number and locations of bird ramps would be determined in the field. Ramps would be constructed with smaller aggregate, concrete grouting between riprap, or articulated mats made from individual concrete blocks tied together in a grid pattern with stainless steel cables or high strength polyester ropes. If mats are used, regular operation and maintenance monitoring would be used to identify any damage to the cables or ropes that may result in the generation of marine debris. Due to the mats' inherent flexibility, they would be placed upon and conform to the shape of the underlying rock containment dikes. Once placed, space between individual concrete blocks would be filled with #8 limestone, which would provide a smooth stone surface for young fledgling birds to access the water.

3.1.2 Design Alternative 2A – Non-preferred Alternative

Design Alternative 2A is similar to the Preferred Alternative as it would create 30 acres of brown pelican habitat and 7 acres of tern and skimmer habitat. However, it would have higher Cell 1 construction elevations (**Table 3-2**). Additionally, there would be no tidal exchange point to promote and enhance fish access in Cell 1 (**Figure 3-3**).

Table 3-2. Design Alternative 2A – Non-preferred Alternative Cell Construction Elevations and Vegetation Summary

Cell	Construction Elevation (feet NAVD 88)	Five-Year Settled Elevation (feet NAVD 88)	Cover/Vegetation	Management
1	1.5 to 2.5	0.75 to 2.0	Natural revegetation/recruitment with plantings in future years, if needed	Invasive vegetation to be controlled by LDWF, as needed
2	2.5 to 3.75	2.0 to 2.5	Planted or hydroseeded with marsh elder or groundsel bush	Invasive vegetation to be controlled by LDWF
3	3.75 to 5.0	2.5 to 3.5	Six-inch crushed limestone layer (~7-acre footprint) with remainder of cell planted or hydroseeded with marsh elder or groundsel bush	Vegetation to be controlled by LDWF, as needed



3.2 Rationale of Selection of Design Alternative 2B – Preferred Alternative

The Preferred Alternative (Design Alternative 2B) fulfills the habitat restoration goal of constructing at least 21 to 32 acres of pelican and other colonial waterbird habitat (Cells 1, 2, and 3) and approximately 7 acres of tern and skimmer habitat (Cell 3). Additionally, the Preferred Alternative would settle to an intertidal elevation soon after construction and include a tidal exchange point that would enhance fisheries access into Cell 1. Therefore, the Preferred Alternative was selected because it would create benefits to nesting colonial waterbirds while also avoiding and minimizing impacts to EFH and marine and estuarine fauna.

Section 4

Affected Environment and Environmental Consequences

4.1 Introduction

This section includes a description of the affected environment and an analysis of the environmental consequences of the design alternatives for Queen Bess Island Restoration Project. The design alternatives addressed in this section are proposed under OPA and meet the level of federal agency involvement to require review. To determine whether an action has the potential to result in significant impacts, the context and intensity of the action must be considered. Context refers to the area of impacts (e.g., local, statewide) and their duration (e.g., whether they are short- or long-term impacts). Intensity refers to the severity of an impact and could include the timing of the action (e.g., more intense impacts would occur during critical periods of high visitation or wildlife breeding/rearing). Intensity is also described in terms of whether the impact would be beneficial or adverse. For purposes of this document, impacts are characterized as minor, moderate, or major and temporary or long-term. Impacts were assessed in accordance with the guidelines in the Final PDARP/PEIS, Table 6.3-2 (**Appendix A**).

The analysis of beneficial impacts focuses on the duration (short- or long-term) without attempting to specify the intensity of the benefit as is consistent with that used in the Final PDARP/PEIS. “Adverse” is used in this section only to describe the federal trustees’ evaluation under NEPA. That term is defined and applied differently in consultations conducted pursuant to the ESA and other protected resource statutes. The results of any completed protected resources consultations are included in the Administrative Record.

Where applicable, site-specific information is provided for each design alternative. However, if there would be no environmental impacts or negligible to minimal impacts to a resource and the impacts would be similar for all design alternatives (e.g., air quality), then the environmental consequence evaluation is conducted on all design alternatives. The results of these analyses and the affected environment are presented in Section 4.2. Sections 4.3 and 4.4 present the affected environment and environmental consequences for all other resources.

4.2 Minimally Affected Resources

4.2.1 Physical Environment

4.2.1.1 Air Quality

EPA developed the National Ambient Air Quality Standards (NAAQS) that list six atmospheric pollutants considered harmful to public health in accordance with the Clean Air Act of 1970 (as amended). The six pollutants are carbon monoxide, lead, nitrogen dioxide, ozone, particulate matter, and sulfur dioxide. LDEQ is responsible for regulating and ensuring compliance with the Clean Air Act in Louisiana. For compliance purposes, geographic areas within the United States are classified as either in attainment or nonattainment for air quality. Geographic areas that have

all six criteria pollutants below NAAQS are considered in attainment, whereas areas exceeding these levels are considered nonattainment areas. In nonattainment areas, EPA requires states to develop and/or revise a state implementation plan (SIP) to ensure the standards will be attained. On May 2, 2018, Governor John Bel Edwards announced that the entire State of Louisiana was in compliance with NAAQS.

EPA has determined that Jefferson Parish is currently below NAAQS and thus in compliance with the standards. Therefore, Queen Bess Island is in an attainment area for air quality. A qualitative analysis was completed for the design alternatives. Impacts to air quality would be minor and limited to construction activities. An increase in vegetation could potentially provide a long-term benefit to air quality for the area. Under both action alternatives (Preferred and Non-preferred Alternatives), short-term, minor, adverse air quality impacts may occur during construction due to the dust and fumes from equipment and earthwork activities. Additional effects may also arise from an increase in boat traffic required to deliver equipment, materials, and construction workers to the island.

4.2.1.2 Noise

The Final PDARP/PEIS (Chapter 6; DWH Trustees 2016a) states the primary sources of terrestrial noise in the coastal environment are transportation- and construction-related activities, which is consistent with areas affected by this draft Phase 2 RP/EA #1.1. The primary sources of ambient (background) noise in the project area are recreational boating vessels and natural sounds such as wind and wildlife. The level of noise in the project area varies, depending on the season, time of day, number and types of noise sources, and distance from the noise source.

Noise impacts associated with the design alternatives would be mainly from construction activities. The dominant noise sources from construction elements are expected to be earth-moving and dirt-hauling activities. General construction noise impacts would include short-term, minor, adverse effects. Because the closest human activity to Queen Bess Island is over 2.5 miles away, noise impacts from the site to resident populations would not occur. Minor noise impacts to wildlife, such as colonial waterbirds, could occur. However, construction would be conducted during the nonbreeding season to limit noise impacts to colonial waterbirds. Overall, construction noise impacts to the area are expected to be minimal and of short duration. Therefore, impacts to noise would be short-term, minor to negligible, adverse, and limited to construction activities.

4.2.2 Biological Environment

4.2.2.1 Protected Species

A list of federally threatened and endangered species and other protected species (e.g. Marine Mammal Protection Act) with the potential to occur within the project action area was developed based on the U.S. Fish and Wildlife Service (USFWS) Information for Planning and Consultation resource list for the area in which the design alternatives would occur and the Jefferson Parish list (USFWS 2018). Protected species with the potential to occur within the project action area include West Indian manatee (*Trichechus manatus*), loggerhead sea turtle (*Caretta caretta*), bottlenose dolphin (*Tursiops truncatus*), Gulf sturgeon (*Acipenser oxyrinchus desotoi*), piping plover, and pallid sturgeon (*Scaphirhynchus albus*). There is no designated critical habitat present within or directly adjacent to the project action area. Therefore, there would be no impacts to critical habitat.

In accordance with the ESA, the LA TIG recommends a determination of “not likely to adversely affect” for protected species associated with the Preferred Alternative. The project action area is outside of the current recorded ranges of the Gulf and pallid sturgeons. The Gulf sturgeon is present in river and nearshore waters east of the Mississippi River delta. The pallid sturgeon is present in the Mississippi and Atchafalaya Rivers. Piping plovers have not been documented on Queen Bess Island based on currently available data, and most of the island’s shoreline has large rocks that are not optimal habitat for piping plovers. For any in-water work, the design alternatives would implement measures from the NMFS’s *Sea Turtle and Smalltooth Sawfish Construction Conditions* (2006), *Measures for Reducing Entrapment Risk to Protected Species* (2012), and *Vessel Strike Avoidance Measures and Reporting for Mariners* (2008) and USACE’s *Standard Manatee Conditions for In-water Work* (2011). These measures would minimize the potential for impacts to listed sea turtles, West Indian manatee, and bottlenose dolphin. Additionally, construction BMPs and other avoidance and mitigation measures as required by state and federal regulatory agencies would minimize water quality impacts that could affect the aquatic habitat.

The LA TIG is currently coordinating with USFWS through DOI to seek concurrence on the recommended ESA determinations. Any avoidance or conservation measures recommended would be evaluated and incorporated into the final design. All required consultations would be completed prior to project implementation.

4.2.3 Socioeconomic Environment

4.2.3.1 Socioeconomics and Environmental Justice

The intent of an environmental justice evaluation under Executive Order (EO) 12898, *Federal Actions to Address Environmental Justice in Minority and Low-Income Populations*, is to identify communities and groups that meet environmental justice criteria and suggest strategies to reduce potential adverse impacts of projects on affected groups. The purpose of EO 12898 is to identify and address the disproportionate placement of adverse environmental, economic, social, or health impacts from federal actions and policies on minority and/or low-income communities. This order requires lead agencies to evaluate impacts on minority or low-income populations during preparation of environmental and socioeconomic analyses of projects or programs that are proposed, funded, or licensed by federal agencies.

The design alternatives are anticipated to benefit natural resources over the long term. Implementation is anticipated to result in short-term increases in the demand for employment. While some short-term closures to localized areas could occur during project construction, none of these are anticipated in minority or low-income populations. None of the design alternatives evaluated in this draft Phase 2 RP/EA #1.1 would create a disproportionately high and adverse effect on minority or low-income populations. The design alternatives aim to provide habitat benefits to uninhabited islands.

4.2.3.2 Cultural Resources

Cultural resources are evidence of past human activity. These may include pioneer homes, buildings, or old roads; structures with unique architecture; prehistoric village sites; historic or prehistoric artifacts or objects; rock inscription; human burial sites; or earthworks, such as battlefield entrenchments, prehistoric canals, or mounds. Although neither NEPA nor any other

federal law defines “cultural resource,” several laws and executive orders deal with resources that are cultural in character.

As stated in the Final PDARP/PEIS, all projects implemented under subsequent restoration plans and tiered NEPA analyses consistent with the Final PDARP/PEIS would secure all necessary state and federal permits, authorizations, consultations, or other regulatory processes and ensure the project is in accordance with all applicable laws and regulations concerning the protection of cultural and historic resources (DWH Trustees 2016a). Both action alternatives (Preferred and Non-preferred Alternatives) include island construction and sediment and ground disturbance. Preliminary analysis shows that no known cultural resources exist within the area of potential effect, which is the same for both design alternatives (CPRA 2017). If any culturally or historically important resources were identified during project preparations or predevelopment surveys, consultation would be initiated and such areas would be avoided during construction. A complete review of the Preferred Alternative under Section 106 of the National Historic Preservation Act is ongoing and would be completed prior to any activities that would restrict consideration of measures to avoid, minimize, or mitigate any adverse effects on historic properties located in the project area. The Preferred Alternative would be implemented in accordance with all applicable laws and regulations concerning the protection of cultural and historic resources.

4.2.3.3 Land and Marine Management

The Coastal Zone Management Act is a federal act that encourages states to develop coastal management programs for preserving statewide coastal resources. Under this act, once a state develops a federally approved coastal management program, “federal consistency” requires that any federal actions affecting coastal land or water resources (the coastal zone) must be consistent with the state’s program. In Louisiana, the LDNR Office of Coastal Resources oversees the state’s Coastal Zone Management Program (CZM Program). The design alternatives are located within the Louisiana Coastal Zone established by the State and Local Coastal Resources Management Act of 1978 and modified in 2012. The Jefferson Parish CZM Program divided the parish into 12 management units; Queen Bess Island is included in the Bay Management Unit. Goals for managing the coastal resources in this unit include erosion control, marsh restoration, and maintenance of the ecological and hydrological integrity (Jefferson Parish 1982). Queen Bess Island design alternatives would result in long-term, beneficial impacts to land and marine management because of the restoration project’s intent to enhance colonial waterbird nesting and brood-rearing habitat. In a letter dated September 5, 2018, the State of Louisiana Department of Natural Resources Office of Coastal Management stated that the Queen Bess Island Restoration Project is consistent with the approved Louisiana Coastal Resources Program.

4.2.3.4 Tourism and Recreational Use

The design alternatives are on a coastal island uninhabited by people. Visitors may reach the waters adjacent to the island by private or charter boats, which offer opportunities to fish, birdwatch, and sightsee. Because visitors are not permitted on the island, there would be no short- or long-term, adverse effects to tourism and recreational use.

4.2.3.5 Aesthetics and Visual Resources

The design alternatives’ project areas include the coastal island and the nearby open waters. The island contains open water, shoreline, and marsh habitat. All design alternatives would result in

long-term, beneficial impacts to aesthetics and visual resources as they would serve to enhance the island’s capacity for waterbird habitat, allowing for more nesting on the island, thereby enhancing the natural aesthetics and visual resources of the area.

4.2.3.6 Public Health and Safety

Both action alternatives (Preferred and Non-preferred Alternatives) would involve elevating the existing island. Coastal islands act as a buffer to reduce the effects of wave action, saltwater intrusion, storm surge, and tidal current. Therefore, the action alternatives would result in long-term, beneficial effects to public health and safety through the maintenance and enhancement of the coastal island. Queen Bess Island design alternatives would comply with EO 13045, “Protection of Children from Environmental Health Risks and Safety Risks” and do not represent disproportionately high and adverse environmental health or safety risks to children in the United States. Implementation of this project would not increase shoreline erosion or create other health and safety concerns. The elimination of stagnant water on the island could potentially reduce available mosquito breeding habitat, which could potentially benefit public health.

4.3 Resources Analyzed in Detail

4.3.1 Physical Environment

4.3.1.1 Geology and Substrates

4.3.1.1.1 Affected Environment

Queen Bess Island geology is characterized by Holocene-era deltaic deposits comprised mainly of interbedded clay (gray to black with high organic content) and peat, natural levee silt and clay, distributary sand, delta-front sand, and prodelta mud and clay (Louisiana Geological Survey 1984, 2014). Surface soils on Queen Bess Island have been classified by USDA Natural Resources Conservation Service (NRCS) as primarily Scatlake muck with 0 to 0.2 percent slopes (USDA NRCS 2018). These soils are very poorly drained, slowly permeable, and classified as having negligible runoff, which is typical of continuously flooded marine tidal areas and coastal marshes. Recent geotechnical investigations (APS Engineering and Testing, Inc. 2018) down to 40 feet below ground surface primarily encountered soft lean clays and fat clays with organic materials, with alternating layers of loose silty or clayey sands. Previous restoration projects have impacted geology and substrates on Queen Bess Island through the addition of dredged fill material. These projects included the creation of a containment dike, placement of dredged BBWW fill on the island, and shoreline stabilization around the island’s perimeter (CPRA 2018). The geography of coastal islands like Queen Bess Island is highly dynamic and greatly affected by weather conditions. Between 1998 and 2010, the island lost 1.7 acres of intertidal marsh and decreased in size by approximately 4.7 percent while other islands in nearby coastal Louisiana decreased in size by as much as 100 percent. The island’s comparative stability during this period is considered in large part due to previous shoreline stabilization efforts (Selman et al. 2016).

4.3.1.1.2 Environmental Consequences

Design Alternative 2B – Preferred Alternative

Several aspects of the Preferred Alternative are expected to have environmental consequences for geology and substrates, including:

- Placement of sand fill material to the designated construction elevations
- Placement of a 6-inch layer of limestone in Cell 3
- Revegetation in Cells 1, 2, and 3
- Marsh nourishment in Cell 1
- Creation of a tidal exchange point in Cell 1
- Installation of breakwaters along the southwestern shore and near the tidal exchange point

The Preferred Alternative involves placing sand to create a southwest to northeast slope across the island. The open water area in Cell 3 would be filled entirely with sand, and a large portion of the cell would be topped with a 6-inch layer of crushed limestone to create an elevated, unvegetated platform for nesting terns and skimmers. Following sand placement, the existing Scatlake muck would be buried, and the island's surface soils would be predominantly sand or sand and limestone. Therefore, the placement of large quantities of substrates across the island constitutes a long-term, moderate, adverse impact to island substrates. However, the Preferred Alternative is expected to have minimal impact on the island's overall footprint.

Fill material would consist of permitted sand that is sourced from an approved quarry or sand pit. The sand would be transported to the project site by barge via the BBWW (**Figure 3-2**). After sand placement, revegetation efforts are intended to promote establishment of vegetation, which would help stabilize soils and reduce soil loss due to erosion in the long term. Therefore, this revegetation would have a long-term, beneficial impact on substrates. Short-term, minor, adverse impacts to substrates (e.g., localized soil disturbances, soil compaction) would result from the use of heavy equipment during construction.

Short-term, minor, adverse impacts to terrestrial substrates, such as localized soil disturbances or compaction, may result from use of heavy equipment during site preparation and restoration implementation. These impacts likely would be localized to small areas and offset by the beneficial restoration activities. Staging areas for construction equipment and materials have not yet been finalized. The establishment of construction BMPs would help to minimize impacts of construction, staging areas, and site preparation on substrates. BMPs could include the implementation of erosion controls, development of and adherence to a stormwater management plan, and ongoing construction monitoring. Avoiding sand fill placement before or during severe weather would minimize erosion during construction.

In-water work is anticipated during breakwater construction that includes placement of permanent hardened structures along the island's southwestern shore and adjacent to the tidal exchange point. These breakwaters would provide a short- and long-term, beneficial impact as they would provide shoreline erosion protection via wave energy dissipation. Breakwater designs and construction materials have not been finalized. The in-water construction activities would result in localized disturbances to aquatic substrates, constituting short-term, minor, adverse impacts. Overall, the Preferred Alternative would result in minor, short- and long-term, beneficial effects on substrates.

Design Alternative 2A – Non-preferred Alternative

Under the Non-preferred Alternative, impacts to the island's existing surface soils would be similar to those under the Preferred Alternative, including localized soil disturbances or

compaction from the use of heavy equipment during site preparation and short-term, minor, adverse impacts related to in-water construction activities. The Non-preferred Alternative would result in the same short- and long-term, beneficial effects on substrates as the Preferred Alternative.

No Action Alternative

Under the No Action Alternative, the Queen Bess Island Restoration Project would not be implemented. None of the proposed alterations to the island's geology or substrates (i.e., sand fill placement, limestone placement, revegetation) would occur. In the short term, the geology and substrate conditions at the project site would remain the same as described in the affected environment section. However, over the long term, the benefits to substrates would not be realized, and the conditions would continue to deteriorate due to local subsidence and sea level rise. Therefore, under the No Action Alternative, impacts to substrates would be considered adverse.

4.3.1.2 Hydrology and Water Quality

4.3.1.2.1 Affected environment

Queen Bess Island is in Barataria Basin, Jefferson Parish, Louisiana. The entire basin is approximately 1,565,000 acres (CWPPRA 2018). Freshwater inputs to the basin are primarily rainfall as the construction of levees along the Mississippi River has prevented freshwater and sediment inputs to the basin (CWPPRA 2018). Based on the *Final 2016 Louisiana Water Quality Integrated Report* (LDEQ 2016), Barataria Bay (subsegment LA021101_00), which includes Queen Bess Island, is listed as fully supporting the designated use for primary contact recreation, secondary contact recreation, fish and wildlife propagation, and oyster propagation. Therefore, there are no current water quality impairments at Queen Bess Island and the adjacent waters.

Cell 3 is typically open water, whereas the remaining areas of the island include open water and low elevation marshes. Queen Bess Island is located within the Federal Emergency Management Area- (FEMA-) designated Flood Zone VE, which is subject to inundation by the 1-percent-annual-chance flood event, with additional hazards due to storm-induced velocity wave action (FEMA Map Number 22051C0525 E 1995).

4.3.1.2.2 Environmental Consequences

Design Alternative 2B – Preferred Alternative

The Preferred Alternative involves sand placement across the island to create a gradual slope, which would alter the island's surface conditions. Fill material placement would result in impacts to island hydrology and water quality while impacts in the surrounding area should be minimal. Therefore, the Preferred Alternative would result in local, short- and long-term, minor to moderate impacts to hydrology within the island.

Due to the new island surface slope and increased quantity of erodible surface substrates, the Preferred Alternative could result in increased runoff and surface soil loss from the island that would decrease over time as vegetation established. However, the proposed fill substrates (sand and crushed limestone) are highly permeable, and the project footprint is relatively small. Additionally, the proposed revegetation efforts and natural establishment of vegetation would

serve to stabilize soils and reduce soil loss. Therefore, the impacts to local water quality from increased surface soil erosion are expected to be short-term, minor, and adverse.

Loss of sand from barges during transport to the island may result in localized, temporary increases in suspended sediment concentrations near the barge. Sand loss from barges would be a short-term, negligible, adverse impact to turbidity.

Short-term, minor, adverse impacts to water quality on and near Queen Bess Island are expected during implementation of restoration and construction activities. Localized erosion and sediment transport are expected during fill material placement and installation of the breakwaters. The use of barges, other vehicles, and equipment during implementation and monitoring could also result in short-term, minor, adverse impacts to water quality due to potential fuel leaks or vehicle fluid leaks. The construction BMPs, in addition to other avoidance and mitigation measures as required by state and federal regulatory agencies, would minimize water quality and hydrology impacts.

Long-term impacts to water quality would result from the increase in bird population on Queen Bess Island following restoration. The Preferred Alternative targets increasing the island's colonial waterbird nesting and brood-rearing habitat from less than 5 acres to approximately 36 acres. Increasing the amount of nesting and brood-rearing habitat is expected to increase the number of colonial waterbirds that occupy the island during nesting and brood-rearing seasons. The increased bird population would result in increased fecal matter loading to waters on and surrounding the island and would therefore represent a long-term, moderate, adverse impact to water quality. However, this fecal matter loading would be similar to historic conditions at the island.

The creation of a tidal exchange point in Cell 1 would produce long-term, beneficial impacts to water quality and hydrology through marsh enhancement and colonization. The intertidal-range elevations would trap sediment and nutrients, encouraging vegetation growth that would provide water quality benefits.

Herbicide application would be conducted by LDWF in the spring and fall in a manner similar to the methods used successfully at the State of Louisiana's Marsh Island Wildlife Refuge to maintain suitable tern and skimmer nesting and brood-rearing habitat. Periodic herbicide application to reduce or prevent plant growth in Cell 3 would result in increased herbicide loading to adjacent waters due to runoff and possible herbicide leaks from storage tanks and application equipment. The use of boats or other vehicles to apply herbicides would also create potential risk for vehicle fuel or fluid leaks. Herbicide selection, with maximum toxicity to target vegetation and minimal toxicity in aquatic environments and to nontarget species, would minimize water quality impacts from herbicide application. Development of BMPs designed to minimize herbicide application frequency while maximizing effectiveness would also reduce water quality impacts from herbicide use. For example, prohibiting herbicide application during windy conditions or before or during rain events would reduce transport of herbicides to the water. All herbicide application would be conducted in accordance with the manufacturer's recommendations. Herbicide use and application activities, including operation of vehicles and equipment during application, represents a long-term, minor, adverse impact to water quality.

Overall, the Preferred Alternative would result in short- and long-term, negligible to moderate, adverse effects to water quality in the adjacent waters of Queen Bess Island. Additionally, the Preferred Alternative would result in negligible effects to suspended particulates and turbidity in the adjacent waters of the island. Due to the Preferred Alternative footprint being similar to the current island footprint, the Preferred Alternative would have a negligible effect on water current patterns, normal water fluctuations, and salinity gradients in the waters adjacent to the island. The construction of breakwaters would have a long-term, minor effect on nearshore water current patterns.

Design Alternative 2A – Non-preferred Alternative

Under the Non-preferred Alternative, impacts to hydrology and water quality would be similar to those under the Preferred Alternative. However, under the Non-preferred Alternative, there would not be the beneficial impacts associated with a tidal exchange point in Cell 1 that would provide tidal flushing and the associated benefits to water quality. Therefore, there would be fewer long-term, beneficial impacts to hydrology and water quality under the Non-preferred Alternative compared to the Preferred Alternative.

No Action Alternative

Under the No Action Alternative, the proposed placement of sand fill material would not occur, and the hydrology of the island would remain unchanged. The No Action Alternative would result in fewer short-term, minor, adverse impacts compared to the Preferred Alternative because no restoration and construction activities with potential for water quality impacts (fill placement, breakwater installation, and use of equipment) would occur. The No Action Alternative would also result in fewer long-term, moderate, adverse impacts to fecal coliform water quality due to smaller colonial waterbird populations. Under the No Action Alternative, spraying of herbicides would not be conducted, thus, reducing long-term, minor, impacts to water quality compared to the Preferred Alternative. However, under the No Action Alternative, local subsidence and sea level rise would continue, which would result in long-term, moderate, adverse impacts to both hydrology and water quality within Queen Bess Island and in the adjacent waters. Under the No Action Alternative, there would be long-term, adverse impacts to water current patterns, normal water fluctuations, and salinity gradients.

4.3.2 Biological Environment

4.3.2.1 Habitats

4.3.2.1.1 Affected Environment

The Queen Bess Island is a coastal island containing many wetland and open water communities that provide habitat for a diversity of plant and animal species. Like many Louisiana coastal islands, this island experienced significant erosion and has decreased in size over the last 100 years (LDNR 1998). The habitats currently present are mainly a result of man-made restoration efforts performed in the 1990s with the intention of limiting island erosion and restoring brown pelican nesting and brood-rearing habitat. Descriptions of the five habitat types currently present on Queen Bess Island follow:

Emergent Marsh: This habitat type can be characterized as a salt marsh, which is a regularly tidally flooded, flat, polyhaline area dominated by salt-tolerant grasses and few other species. The

salt marsh on Queen Bess Island is almost entirely dominated by smooth cordgrass (*Spartina alterniflora*) broken up by areas of open water and intertidal zone. This habitat type is considered an important nursery area for shrimp, crabs, and a variety of fish species and enhances the production of marine organisms in adjacent waters (Holcomb et al. 2015).

Mangrove Swamp: Although sometimes termed a swamp, the physiognomy of the mangrove community in Louisiana more closely resembles a shrub thicket. The coastal region of Louisiana delimits the northern range of this community due to mangrove's inability to tolerate temperatures much below freezing (Holcomb et al. 2015). Other characteristic vegetation besides black mangrove is smooth cordgrass. Salt marshes and mangrove habitats are integral parts of the Louisiana coastal island system. Mangrove habitats provide important ecological functions:

- Extensive root systems stabilize the shoreline and reduce erosion.
- The cover and food they provide create excellent nursery areas for fish and shellfish.
- The community improves surrounding water quality by filtering nutrients and suspended sediments.
- Many colonial waterbirds use mangroves as nesting areas.

Intertidal Zone: This habitat type consists of mudflat areas above water at low tide and occasionally under water at high tide, which provides important foraging habitat for breeding shorebirds. Invertebrates, such as crabs and clams, also inhabit the intertidal zone.

Coastal Dune: This habitat type consists of scattered areas of shrubs such as groundsel bush, which is present but sparse on Queen Bess Island. The island's high erosion rate has not allowed shrub thickets to form. Coastal dune communities can easily be destroyed by dune migration or erosion and replaced by grasslands. Sand and shell beach habitat and dune habitat with scattered areas of shrubs are present around the perimeter of the island landward of the rock dike that surrounds the island (CPRA 2018).

Intertidal Beach: This habitat type consists as a small beach principally comprised of a sand and shell fragments located in areas landward of the rock dike.

The location of these island habitat types has been driven by past restoration projects in combination with edaphic features and tidal influence. While the cells are often dominated by one habitat type, several habitats are often present in each cell. A survey of island elevations and associated tidal regimes present in each cell was conducted in 2017 (**Table 4-1; Figure 4-1**).

Table 4-1. Cell Tidal Regime and Habitat Coverage

Cell	Dominant Tidal Regime	Other Tidal Regimes Present	Prevalent Habitats
1	Intertidal	Supratidal	Open Water, Emergent Marsh, and Mangrove Swamp
2	Intertidal	Supratidal	Open Water, Emergent Marsh, and Mangrove Swamp
3	Subtidal	Supratidal, Intertidal	Open Water



4.3.2.1.2 Environmental Consequences

Design Alternative 2B – Preferred Alternative

The Preferred Alternative would create 30 acres of brown pelican habitat and 7 acres of tern and skimmer habitat. This would be accomplished through marsh nourishment in Cell 1 and placement of fill material in Cells 2 and 3 along with placement of a 6-inch layer of crushed limestone within a designated section in Cell 3 (approximately 7 acres). Within Cell 1, marsh nourishment would result in enhancements to the island's existing 9 acres of salt marsh and mangrove vegetation. The Preferred Alternative is not expected to fully impact existing mangrove and emergent marsh habitats in Cell 1, thereby providing potential colonial waterbird nesting and brood-rearing habitat following construction. In Cell 2, the placement of fill and marsh planting would allow for a variety of vegetation growth and nesting substrate options for colonial waterbirds. In Cell 3, the open water habitat would be converted to a supertidal dune-like feature. Following settlement to intertidal elevations, Cell 1 would be planted, which would provide additional habitat for a variety of wildlife and fisheries species.

Fill material would be transported on barges to Queen Bess Island. Contractors and subcontractors would secure approval of the access route to the island from LDWF and ingress and egress to project locations only along the approved routes. Details on the construction equipment and methods would be provided during the forthcoming final engineering and design phase.

Compliance with permit conditions and implementation of monitoring programs would likely minimize the adverse effects on habitats. BMPs would be implemented to minimize the magnitude and duration of impacts to aquatic habitats. Signage or buoys would be used to mark access routes for barges. BMPs during construction may include minimizing the duration of construction and controlling the release of fill materials to targeted areas.

Overall, the Preferred Alternative would have a short- and long-term beneficial effect on salt marsh and black mangrove habitats. There would be temporary impacts to wetlands in Cell 1. However, long-term benefits would be realized due to plantings and marsh nourishment. There would be long-term, adverse impacts to the open water communities in Cell 3 due to the conversion to supertidal dune-like habitats.

Design Alternative 2A – Non-preferred Alternative

Under the Non-preferred Alternative, impacts to habitats would be similar to those under the Preferred Alternative, including the short- and long-term, beneficial impacts to salt marsh and mangrove habitats and the short-term, minor, adverse impacts from construction disturbances. However, because the Non-preferred Alternative does not include creation of a tidal exchange point with an adjacent breakwater, there would be fewer short-term, minor, adverse impacts associated with construction disturbances directly adjacent to that area (approximately 0.36 acres). Additionally, fill elevations would initially be approximately 1 foot higher in Cell 1 compared to the Preferred Alternative. Therefore, intertidal habitats would not likely develop within the first year under the Non-preferred Alternative.

No Action Alternative

Under the No Action Alternative, construction activities would not occur, and colonial waterbird nesting and brood-rearing habitat would not be restored. Therefore, no short-term, adverse impacts to habitats would be expected. However, under the No Action Alternative, local subsidence and sea level rise would continue, which would result in long-term, adverse impacts to the salt marsh and mangrove habitats on the island. Additionally, there would be no improvements to the open water habitat in Cell 3 nor the intertidal zone in Cell 2, which would continue to decrease the available amount of suitable nesting and brood-rearing habitat for brown pelican, tern, and black skimmer. Thus, under the No Action Alternative, there would be long-term, adverse impacts to both the open water areas in Cell 3 and the wetland communities in Cells 1 and 2.

4.3.2.2 Wildlife Species

4.3.2.2.1 Affected Environment

Queen Bess Island is one of Louisiana's largest and most productive breeding colonies for several colonial nesting bird species, including brown pelicans (LA TIG 2017a). The island contains habitats conducive to breeding colonies of pelicans, terns, and skimmers. According to LDWF, the most prevalent nesting species on Queen Bess Island include brown pelicans, great egret (*Ardea alba*), tricolored heron (*Egretta tricolor*), black-crowned night heron (*Nycticorax nycticorax*), and snowy egret (*Egretta thula*). In addition to these species, there are many wildlife species that have been observed using the island. A total of 63 bird species have been recorded on Queen Bess Island (**Table 4-2**) (Cornell 2018), including a variety of gulls, herons, night herons, egrets, sandpipers, sparrows, terns, shorebirds, and waterfowl.

Table 4-2. Bird Species Observed at Queen Bess Island

Common Name	Scientific Name	Common Name	Scientific Name
American avocet	<i>Recurvirostra americana</i>	marsh wren	<i>Cistothorus palustris</i>
American coot	<i>Fulica americana</i>	masked booby	<i>Sula dactylatra</i>
American oystercatcher	<i>Haematopus palliatus</i>	mottled duck	<i>Anas fulvigula</i>
American white pelican	<i>Pelecanus erythrorhynchos</i>	neotropic cormorant	<i>Phalacrocorax brasilianus</i>
barn swallow	<i>Hirundo rustica</i>	northern shoveler	<i>Spatula clypeata</i>
black skimmer	<i>Rynchops niger</i>	reddish egret	<i>Egretta rufescens</i>
black-bellied plover	<i>Pluvialis squatarola</i>	red-winged blackbird	<i>Agelaius phoeniceus</i>
black-crowned night heron	<i>Nycticorax nycticorax</i>	ring-billed gull	<i>Larus delawarensis</i>
black-necked stilt	<i>Himantopus mexicanus</i>	roseate spoonbill	<i>Platalea ajaja</i>
blue-winged teal	<i>Spatula discors</i>	royal tern	<i>Thalasseus maximus</i>
brown pelican	<i>Pelecanus occidentalis</i>	ruddy turnstone	<i>Arenaria interpres</i>
Caspian tern	<i>Hydroprogne caspia</i>	sanderling	<i>Calidris alba</i>
clapper rail	<i>Rallus crepitans</i>	sandwich tern	<i>Thalasseus sandwichensis</i>
common loon	<i>Gavia immer</i>	Savannah sparrow	<i>Passerculus sandwichensis</i>
common tern	<i>Sterna hirundo</i>	seaside sparrow	<i>Ammodramus maritimus</i>
double-crested cormorant	<i>Phalacrocorax auritus</i>	semipalmated plover	<i>Charadrius semipalmatus</i>
dunlin	<i>Calidris alpina</i>	semipalmated sandpiper	<i>Calidris pusilla</i>
Forster's tern	<i>Sterna forsteri</i>	short-billed dowitcher	<i>Limnodromus griseus</i>
great blue heron	<i>Ardea herodias</i>	snowy egret	<i>Egretta thula</i>
great egret	<i>Ardea alba</i>	Sora	<i>Porzana carolina</i>
green-winged teal	<i>Anas crecca</i>	spotted sandpiper	<i>Actitis macularius</i>
gull-billed tern	<i>Gelochelidon nilotica</i>	stilt sandpiper	<i>Calidris himantopus</i>
herring gull	<i>Larus argentatus</i>	swamp sparrow	<i>Melospiza georgiana</i>
killdeer	<i>Charadrius vociferus</i>	tricolored heron	<i>Egretta tricolor</i>
laughing gull	<i>Leucophaeus atricilla</i>	western sandpiper	<i>Calidris mauri</i>
least bittern	<i>Ixobrychus exilis</i>	whimbrel	<i>Numenius phaeopus</i>
least sandpiper	<i>Calidris minutilla</i>	white ibis	<i>Eudocimus albus</i>
least tern	<i>Sternula antillarum</i>	white-rumped sandpiper	<i>Calidris fuscicollis</i>
lesser yellowlegs	<i>Tringa flavipes</i>	willet	<i>Tringa semipalmata</i>
little blue heron	<i>Egretta caerulea</i>	Wilson's phalarope	<i>Phalaropus tricolor</i>
long-billed dowitcher	<i>Limnodromus scolopaceus</i>	yellow-crowned night	<i>Nyctanassa violacea</i>
magnificent frigatebird	<i>Fregata magnificens</i>	heron	

Notes: Observations as documented in the Cornell Lab of Ornithology eBird database (2018).

A historical review of available research was completed to determine optimal species habitats and guide the development of high-quality habitat in the conceptual design alternative (CPRA 2018). The results of this review are summarized below, including wildlife population trends for Queen Bess Island.

Brown Pelicans

During the DWH oil spill and associated response activities (2010–11), brown pelican populations experienced significant losses among all age groups and lost reproduction opportunities. The DWH Trustees documented a 43 percent decrease in brown pelican nesting pairs on Queen Bess Island between May and June 2010 (Baker et al. 2015), an irregular observation as peak colony abundance in Louisiana typically occurs in mid- to late June. Further, significant oiling of island colonies, such as Queen Bess within Barataria Bay, was documented in mid-May 2010 and continued throughout the summer. This observation coincided directly with the observed decline in the island's nesting pairs.

Terns

In 2014, no nesting terns were observed on Queen Bess Island. In 2013, there were 50 royal tern (*Thalasseus maximus*) pairs. The DWH oil spill resulted in a combined loss of thousands of terns from either direct mortality or the loss of potential fledglings due to the mortality of breeding-age birds (DWH Trustees 2016a). The population of terns on Queen Bess Island decreased 64 percent between May and June 2010 (CPRA 2018).

Black Skimmer

In 2014, no nesting black skimmers were observed on Queen Bess Island. The last observation of black skimmers nesting pairs on Queen Bess Island was in 1997. Since 2010, black skimmer nest failure has generally and drastically increased in Louisiana colonies (CPRA 2018; Furfey 2014)

4.3.2.2 Environmental Consequences

Design Alternative 2B – Preferred Alternative

All project-related changes are to be implemented to improve nesting and brood-rearing habitat for brown pelicans and other colonial nesting waterbirds. During the implementation of changes to the habitats of Queen Bess Island, breeding birds and overwintering foraging birds (e.g., plovers, sandpipers, dowitchers) may be displaced temporarily. These birds may need to find other areas to forage and loaf. However, these impacts would be short-term. The design plan is for pelicans to return to the island between 0 and 3 years and terns and black skimmers to return to the island the first nesting season after construction.

Short-term, adverse impacts to nesting and brood-rearing habitat resulting from construction would be moderate for the first year of construction and decrease each year after construction. However, these short-term impacts would only impact the current acreage (less than 5 acres) of nesting and brood-rearing habitat on Queen Bess Island. The Preferred Alternative would result in long-term, beneficial effects to breeding colonial nesting bird populations of Queen Bess Island, the State of Louisiana, and the northern Gulf of Mexico. Secondary, long-term benefits to overwintering bird populations that forage on the island would also occur. BMPs could be implemented to minimize the magnitude and duration of short-term, minor impacts to wildlife. These would include BMPs necessary for control of erosion and sedimentation due to the delivery of fill material via barge.

Design Alternative 2A – Non-preferred Alternative

Under the Non-preferred Alternative, impacts to wildlife would be similar to those under the Preferred Alternative. There would be short-term, adverse impacts to nesting and brood-rearing bird habitat as the result of construction and long-term, beneficial effects to colonial waterbirds. Under the Non-preferred Alternative, there would not be a tidal exchange point that would enhance habitat. Therefore, compared to the Preferred Alternative, there would be fewer long-term, beneficial impacts and greater long-term, adverse impacts to wildlife.

No Action Alternative

Under the No Action Alternative, there would be no direct impacts to wildlife. Construction activities would not occur, and colonial waterbird nesting and brood-rearing habitat would not be restored. Therefore, no additional short-term, beneficial impacts to habitats would be expected. The project site conditions would remain largely the same in the short term. There would be

long-term, adverse impacts to wildlife populations of terns, skimmers, and colonial waterbirds because suitable nesting and brood-rearing habitat would continue to be converted to open water due to local subsidence and sea level rise. These habitats would continue to degrade to the point where few, if any, colonial nesting waterbirds would successfully nest and raise young on the island. In summary, the No Action Alternative would result in fewer short-term, adverse impacts to localized habitats but would result in more long-term, adverse impacts to Queen Bess Island wildlife populations compared to the Preferred Alternative.

4.3.2.3 Marine and Estuarine Fauna, Essential Fish Habitat, and Managed Fish Species

4.3.2.3.1 Affected Environment

The water bodies and wetlands within and adjacent to the project area provide essential nursery and foraging habitats supportive of a variety of aquatic fauna, including economically important estuarine and saltwater species (**Table 4-3**). Historically, shrimp generate the largest share of this income followed by oysters (*Crassostrea virginica*), menhaden (*Brevoortia patronus*), blue crab (*Callinectes sapidus*), and striped mullet (*Mugil cephalus*) (Louisiana Coastal Wetlands Conservation and Restoration Task Force and the Wetlands Conservation and Restoration Authority 1998). The menhaden purse-seine fishery handles the largest volume of the catch, and shrimp and menhaden boats can be observed fishing a few miles south of Queen Bess Island. In addition, nearby there are important recreational fisheries for the species listed above and spotted seatrout (*Cynoscion nebulosus*), sand seatrout (*Cynoscion arenarius*), black drum (*Pogonias cromis*), pompano (*Trachinotus carolinus*), and southern flounder (*Paralichthys lethostigma*).

The Gulf of Mexico Fishery Management Council (GMFMC) has delineated EFH for federally managed species in coastal Louisiana (GMFMC 2005). At Queen Bess Island, EFH has been designated in the nearshore and estuarine open water and wetland habitats for red drum (*Sciaenops ocellatus*), reef fish, sharks, and shrimp (**Table 4-3**).

Table 4-3. Federally Managed Species in the Queen Bess Island Restoration Project Area

Common Name	Scientific Name
REEF FISH	
gray (mangrove) snapper	<i>Lutjanus griseus</i>
lane snapper	<i>Lutjanus synagris</i>
gray triggerfish	<i>Balistes capriscus</i>
SHRIMP	
brown shrimp	<i>Farfantepenaeus aztecus</i>
white shrimp	<i>Litopenaeus setiferus</i>
SHARKS	
bull shark	<i>Carcharhinus leucas</i>
spinner shark	<i>Carcharhinus brevipinna</i>
Atlantic sharpnose shark	<i>Rhizoprionodon terraenovae</i>
finetooth shark	<i>Carcharhinus isodon</i>
scalloped hammerhead shark	<i>Sphyrna lewini</i>
RED DRUM	
red drum	<i>Sciaenops ocellatus</i>

4.3.2.3.2 Environmental Consequences

Design Alternative 2B – Preferred Alternative

Marsh nourishment and the tidal exchange point in Cell 1 are expected to improve marsh and aquatic habitat, which would avoid and minimize impacts to EFH in Cell 1 by increasing the quantity and quality of nursery habitats.

Herbicide application could cause short- and long-term, minor, adverse impacts to water quality within and directly adjacent to Queen Bess Island. This could have short- and long-term, minor, adverse impacts to aquatic fauna if these herbicides are not applied properly and enter the nearby waters.

The Preferred Alternative includes the placement of fill material in Cells 2 and 3. This action would permanently impact the open water habitat of Cell 3 and the open water and intertidal habitat of Cell 2. Both of these habitats have degraded over time.

The island's existing EFH is considered degraded and, therefore, does not serve as good quality fisheries habitat today nor would it in the future. As such, aquatic fauna would likely find refuge in plentiful adjacent habitats in response to temporary disturbance. Therefore, the Preferred Alternative would have long-term, minor, adverse impacts associated with placement of fill material within Cells 2 and 3.

Potential impacts to estuarine and aquatic fauna, managed fisheries, and EFH would be considered and avoided or minimized to the extent practicable during design and construction. When impacts cannot be avoided, BMPs would be implemented to minimize the magnitude and duration of potential impacts to aquatic fauna, EFH, and managed species. BMPs during construction would likely include time-of-year restrictions for any in-water work to avoid and minimize impacts to protected and managed species when they are expected to be present or when most vulnerable (e.g., spawning). They would also likely include standard erosion and sediment control measures to protect water quality and aquatic habitats from impacts resulting from construction and sediment runoff. Specific BMPs for the protection of EFH would be identified and selected based on project elements and chosen construction methods during the final engineering and design. These would include BMPs necessary for control of erosion and sedimentation due to the delivery of dredge material via barge, thereby protecting EFH, shrimp habitat, and nearby oyster beds.

Therefore, overall, there would be short-term, minor to moderate, adverse effects on marine and estuarine aquatic fauna, such as fish, crustaceans, mollusks, and other aquatic organisms, due to construction. However, there would be long-term, beneficial effects on these species due to the habitat restoration. There would be short-term, minor, adverse effects to EFH. However, due to the poor quality EFH present on Queen Bess Island, these effects would be minimal to negligible. Additionally, impacts to EFH have been avoided and minimized under the Preferred Alternative. There could be short-term, minor to negligible, adverse effects to managed fish species due to construction. However, in the long term, there would be beneficial effects on managed fish species.

Design Alternative 2A – Non-preferred Alternative

Under the Non-preferred Alternative, short-term impacts to marine and estuarine aquatic fauna and EFH would be similar to those under the Preferred Alternative. However, under the Non-preferred Alternative, there would be no tidal exchange points to avoid and minimize impacts to aquatic fauna and EFH, which as a result would cause long-term adverse impacts on these resources.

No Action Alternative

Under the No Action Alternative, no additional adverse or beneficial impacts to aquatic fauna, EFH, or managed fisheries would be expected. The conditions at Queen Bess Island would remain largely the same, including the low-quality fish habitat. EFH located in Cell 1 would continue to degrade over time. The No Action Alternative would have a minor, long-term, adverse impact to the existing 9 acres of EFH in Cell 1.

In summary, the No Action Alternative would result in fewer short- and long-term, adverse impacts to localized habitats in Cells 2 and 3. However, due to continued degradation of shallow aquatic habitats, there would be long-term, minor to moderate, adverse impacts to Queen Bess Island fisheries' resources compared to the Preferred Alternative.

4.3.3 Socioeconomic Environment

4.3.3.1 Fisheries and Aquaculture

4.3.3.1.1 Affected Environment

The area surrounding Queen Bess Island is open to recreational and commercial fishing, particularly shrimp, oysters, menhaden, blue crab, and striped mullet. No oyster leases are located within 150 feet of Queen Bess Island (CPRA 2017).

4.3.3.1.2 Environmental Consequences

Design Alternative 2B – Preferred Alternative

Though no oyster leases are located within 150 feet of the island, an existing oyster seed ground and several oyster leases were identified within 1,500 feet of Queen Bess Island and 500 feet of the proposed access corridors. The Preferred Alternative, including access routes, would avoid these sites. Additionally, prior to construction, CPRA would conduct oyster assessments on these sites to document pre-construction conditions. The Preferred Alternative could result in short-term, minor, adverse impacts to fisheries and aquaculture during construction; however, such impacts would be minimized through BMPs.

Design Alternative 2A – Non-preferred Alternative

Under the Non-preferred Alternative, impacts to fisheries and aquaculture would be similar to those under the Preferred Alternative. However, under the Non-preferred Alternative, there would not be a tidal exchange point. Therefore, there would be fewer beneficial impacts to these resources under the Non-preferred Alternative compared to the Preferred Alternative.

No Action Alternative

Under the No Action Alternative, no changes to the island would occur. Thus, the No Action Alternative would result in no impacts to recreational or commercial fisheries and aquaculture.

4.4 Cumulative Impacts: Queen Bess Island

4.4.1 Cumulative Impacts of the Alternatives

4.4.1.1 Potential Cumulative Impacts

Cumulative impacts are defined as “the impact on the environment which results from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions regardless of what agency (federal or non-federal) or person undertake such other actions” (40 CFR § 1508.7). As stated in the Council on Environmental Quality (CEQ) handbook, *Considering Cumulative Effects Under the National Environmental Policy Act* (CEQ 1997), cumulative impacts need to be analyzed in terms of the specific resource, ecosystem, and human community being affected and should focus on effects that are truly meaningful. The Non-preferred Alternative is similar to the Preferred Alternative from a cumulative impact analysis standpoint. Therefore, a cumulative impact analysis was only conducted on the Preferred Alternative. The following section describes the multistep approach used for evaluating cumulative impacts.

4.4.1.2 Methodology of Assessing Cumulative Impacts

Cumulative impacts were evaluated in a manner that was consistent with the methods developed for the Final PDARP/PEIS (DHW Trustees 2016a). Using these methods, cumulative impacts were analyzed using four steps:

- Step 1 – Identify resources affected.
- Step 2 – Establish boundaries. Appropriate spatial and temporal boundaries may vary for each resource.
- Step 3 – Identify a cumulative action scenario.
- Step 4 – Analyze cumulative impacts.

4.4.1.3 Identification of Resources Affected and Boundaries of Analysis

4.4.1.3.1 Resources Affected

Cumulative impacts include each of the resources identified in Physical Environment, Biological Environment, and Socioeconomics and Environmental Justice sections discussed previously. Several of the resources would have no effects, negligible effects, or only short-term, minor effects and, based on their magnitude with respect to context and intensity, would not contribute to cumulative impacts. Therefore, these resources were not included in the cumulative impacts analysis. **Table 4-4** shows the resources excluded from this cumulative impact analysis and the resources that were analyzed for potential environmental consequences that could result from the alternatives:

Table 4-4. Resources Addressed in Cumulative Impact Analysis

Resources Excluded from this Cumulative Impact Analysis	Resources Analyzed for Potential Environmental Consequences
<ul style="list-style-type: none"> ▪ Air quality ▪ Noise ▪ Socioeconomic and environmental justice ▪ Cultural resources 	<ul style="list-style-type: none"> ▪ Geology and substrates ▪ Hydrology and water quality ▪ Habitats ▪ Wildlife species ▪ Protected species

Resources Excluded from this Cumulative Impact Analysis	Resources Analyzed for Potential Environmental Consequences
<ul style="list-style-type: none"> ▪ Fisheries and aquaculture ▪ Marine transportation ▪ Tourism and recreational use ▪ Aesthetics and visual resources 	<ul style="list-style-type: none"> ▪ Marine and estuarine fauna, EFH, and managed fish species ▪ Land and marine management ▪ Public health and safety, including flood and shoreline protection

4.4.1.3.2 Spatial Boundary of Analysis

For this analysis, the spatial boundary includes those areas where the Preferred Alternative would occur and adjacent areas, focusing on actions occurring along, on, and within the vicinity of Queen Bess Island.

4.4.1.3.3 Temporal Boundary of Analysis

Future actions are identified as those actions that are reasonably foreseeable and likely to contribute to the overall cumulative impacts, which include projects that have overlapping impacts with the Preferred Alternative. These include projects that are likely to be started prior to finalization of this draft Phase 2 RP/EA #1.1 and actions that are likely to occur after finalization of this draft Phase 2 RP/EA #1.1.

4.4.1.4 Cumulative Action Scenario

Past, present, and reasonably foreseeable future actions near the alternatives area were identified to effectively consider the potential cumulative impacts. A list of past, existing, and future projects was compiled for each project using Louisiana state, USACE, EPA, USFWS, USDA, and NOAA databases and internet searches for more detail as needed. The project area is coastal, and regulations pertaining to coastal permits were considered appropriate for developing a list of past and reasonably foreseeable future activities that may affect the resources. Based on information obtained from permitting databases, past and potential future activities near the project area include beach nourishment, road maintenance, additional recreational improvements, and pipeline installation.

Based on the assessment summarized in **Table 4-5**, the resource areas with potential for cumulative impacts are geology and substrates; hydrology and water quality; habitats; wildlife species; protected species; marine and estuarine fauna, EFH, and managed fish species; land and marine management; and public health and safety. The alternatives would create long-term benefits to these resources along with some short-term impacts. The anticipated short-term impacts to habitats, wildlife, and protected species from construction could be minimized with the development and implementation of BMPs. The Preferred Alternative would result in short-term, adverse impacts but would also have long-term benefits to the resources. The cumulative effects from the Preferred Alternative and the identified actions are expected to result in cumulative beneficial impacts to geology and substrates; hydrology and water quality; habitats; wildlife species; marine and estuarine fauna, EFH, and managed fish species; protected species; land and marine management; and public health and safety. Therefore, cumulative impacts of the Preferred Alternative are expected to be positive.

4.4.2 Cumulative Impacts of the No Action Alternative

Under the No Action Alternative, Queen Bess Island would remain in its current state. The island would be impacted in the future by local subsidence and sea level rise, which could inundate the island. When the No Action Alternative is analyzed in combination with other past, present, and reasonably foreseeable future actions, short- and long-term, minor, adverse, cumulative impacts on hydrology and water quality; wildlife; habitats; and marine and estuarine fauna, EFH, and managed fish species would likely occur. There would be continued degradation of the island that provides colonial waterbird nesting, foraging, and brood-rearing habitats. Therefore, the No Action Alternative could contribute to adverse, cumulative impacts.

Under the No Action Alternative, the following resources are expected to be adversely impacted:

- Hydrology and water quality
- Habitats
- Wildlife species
- Marine and estuarine fauna, EFH, and managed fish species
- Protected species
- Land and marine management
- Public health and safety

Table 4-5. Past, Present, and Reasonably Foreseeable Future Actions Included in Cumulative Impact Analysis

Category/Projects	Project Description	Key Resource Areas with Potential Cumulative Impacts
Oyster Lake Marsh Creation and Nourishment	The project aims to create approximately 475 acres of saline marsh in recently formed shallow open water and nourish approximately 185 acres of saline marsh. Sediment would be mined from an offshore disposal area and placed in multiple disposal areas to create approximately 660 acres of saline marsh.	<p>Short-term, adverse impacts to:</p> <ul style="list-style-type: none"> ▪ Geology and substrates ▪ Hydrology and water quality ▪ Habitats ▪ Wildlife species ▪ Marine and estuarine fauna, EFH, and managed fish species ▪ Protected species <p>Long-term, adverse impacts:</p> <ul style="list-style-type: none"> ▪ No applicable impacts identified <p>Long-term, positive impacts to:</p> <ul style="list-style-type: none"> ▪ Geology and substrates ▪ Hydrology and water quality ▪ Habitats ▪ Wildlife species ▪ Marine and estuarine fauna, EFH, and managed fish species ▪ Protected species ▪ Tourism and recreational use ▪ Land and marine management ▪ Aesthetics and visual resources ▪ Public health and safety, including flood and shoreline protection
No Name Bayou Marsh Creation and Nourishment	Marshes in the southwest portion of the Cameron Creole Watershed have converted to open water due to subsidence and saltwater intrusion from the Calcasieu Ship Channel. In addition, hurricanes previously breached the levee, scouring the marsh and increasing salinities. This project would create and nourish approximately 533 acres of open water and saline marsh using sediment mined from a nearby USACE confined disposal facility. Approximately 5,000 linear feet of the levee borrow channel would be cleaned out and 10,000 linear feet of tidal creeks and two 2.5-acre ponds constructed to help facilitate hydrologic flow of water into and out of the project area. In addition, 251 acres of vegetation would be planted in the newly created areas.	
Oyster Bayou Marsh Restoration	Created and nourished approximately 849 acres of saline marsh in a shallow open water area that was created by hurricane scour. The features also included constructing approximately 9,000 linear feet of earthen terraces north of the marsh creation area to provide protection from wind-generated erosion to the newly created brackish marsh.	
Cameron-Creole Watershed Grand Bayou Marsh Creation	The project aims to restore and nourish hurricane-scoured marsh in the Cameron Prairie National Wildlife Refuge and adjacent brackish marshes of the Calcasieu Lake estuary. Approximately 3 million cubic yards of material would be dredged from a borrow site proposed in Calcasieu Lake and placed into two marsh creation areas north of Grand Bayou to restore 609 acres and nourish approximately 7 acres of brackish marsh. The borrow site would be designed to avoid and minimize impacts to oysters and other sensitive aquatic habitat. Tidal creeks would be constructed prior to placement of dredge material, and retention levees would be gapped to support estuarine fisheries' access and achieve a functional marsh. The project would result in approximately 534 net acres of brackish marsh over the 20-year project life.	
Cameron-Creole Freshwater Introduction	The freshwater introduction project would restore the function, value, and sustainability to approximately 22,510 acres of marsh and open water by improving hydrologic conditions via freshwater input and increasing organic productivity.	
Sabine Marsh Creation Cycles 6 and 7	Planned future project designed to create 900 acres of marsh and the nourishment of 29 acres of marsh. Marsh will be created both within and outside of the Sabine National Wildlife Refuge.	<p>Short-term, adverse impacts to:</p> <ul style="list-style-type: none"> ▪ Geology and substrates ▪ Hydrology and water quality ▪ Habitats ▪ Wildlife species ▪ Marine and estuarine fauna, EFH, and managed fish species ▪ Protected species <p>Long-term, adverse impacts:</p> <ul style="list-style-type: none"> ▪ No applicable impacts identified <p>Long-term, positive impacts to:</p> <ul style="list-style-type: none"> ▪ Geology and substrates ▪ Hydrology and water quality ▪ Habitats ▪ Wildlife species ▪ Marine and estuarine fauna, EFH, and managed fish species ▪ Protected species ▪ Land and marine management ▪ Aesthetics and visual resources ▪ Public health and safety, including flood and shoreline protection
Caminada Headlands Back Barrier Marsh Creation Project	Planned future project designed to create 300 acres of back barrier intertidal marsh and nourish 130 acres of emergent marsh behind 3.5 miles of Caminada Beach.	
East Mud Lake Marsh Management	The project created a hydrologic regime conducive to restoration, protection, and enhancement of the Mud Lake area by using various types of water control structures and vegetative plantings. Structural components included culverts with flap gates, two variable crest weirs, three earthen plugs, overflow bank, and repair of existing levee.	<p>Short-term, adverse impacts:</p> <ul style="list-style-type: none"> ▪ Not applicable because the project is already constructed <p>Long-term, adverse impacts:</p> <ul style="list-style-type: none"> ▪ No applicable impacts identified <p>Long-term, positive impacts to:</p> <ul style="list-style-type: none"> ▪ Geology and substrates ▪ Hydrology and water quality ▪ Habitats ▪ Wildlife species ▪ Marine and estuarine fauna, EFH, and managed fish species ▪ Protected species
Sweet Lake/Willow Lake Hydrologic Restoration	The project reestablished the shoreline between Sweet Lake and the Gulf Intracoastal Waterway to reduce lake turbidity and tidal exchange and halt erosion and trap sediments needed to rebuild marsh along the northern and northwestern shorelines of Sweet Lake.	
Highway 384 Hydrologic Restoration	The project restored the natural hydrology of the project area and eliminated undesirably high salinities and severe water fluctuations, tremendously reducing the potential for future marsh losses.	
Replace Sabine Refuge Water Control Structures at Headquarters Canal, West Cove Canal, and Hog Island Gully	Water control structures at Hog Island Gully, West Cove, and Headquarters Canals were inadequate in that they did not provide enough discharge potential to discharge excess water and could not be operated to effectively preclude saltwater intrusion. The project replaced the existing structures with ones that have substantially greater discharge potential and greater management flexibility.	
Cameron Meadows Marsh Creation and Terracing	The project aims to restore approximately 400 acres of coastal marsh habitat and reduce the fetch by constructing approximately 12,150 linear feet of earthen terraces. Sediment will be hydraulically dredged from the Gulf of Mexico and pumped via pipeline to create approximately 380 acres of marsh. Approximately 180 acres will be planted. Approximately 12,150 linear feet of earthen terraces will be constructed to reduce fetch and wind-generated wave erosion.	

Category/Projects	Project Description	Key Resource Areas with Potential Cumulative Impacts
Kelso Bayou Marsh Creation	The project aims to restore and protect approximately 319 acres of critically important marsh and the numerous functions provided by those areas. The proposed project will restore a portion of the historic meandering channel of Kelso Bayou and provide direct protection to Louisiana State Highway 27, the region’s only northward hurricane evacuation route. Project features include creating/nourishing 319 acres of marsh, 3,200 linear feet of shoreline protection, and rock armor at the mouth of Kelso Bayou to prevent additional tidal scour.	<ul style="list-style-type: none"> ▪ Tourism and recreational use ▪ Land and marine management ▪ Aesthetics and visual resources ▪ Public health and safety, including flood and shoreline protection
Holly Beach Sand Management	The project protects approximately 8,000 acres of existing, low energy intermediate and brackish marsh wetlands north of the forested ridge and created and protected roughly 300 acres of beach dune and coastal chenier habitat from erosion and degradation.	
Sabine Refuge Marsh Creation, Cycle 1	The project was intended to strategically create marsh in large, open water areas to block wind-induced saltwater introduction and freshwater loss. Over time, it would increase nourishment in adjacent marshes while reducing open water fetch and erosion of marsh fringe.	
Sabine Refuge Marsh Creation, Cycle 2	The Sabine Refuge Marsh Creation Cycle 2 project consisted of approximately 3.54 miles of 29-inch inside diameter permanent pipeline. The purpose of the project was to provide a permanent dredged material pipeline to be used for additional cycles of marsh creation on the Sabine National Wildlife Refuge and surrounding areas in conjunction with USACE maintenance dredging of the Calcasieu River Ship Channel.	
Sabine Refuge Marsh Creation, Cycle 3	The project consisted of constructing five marsh creation sites within the Sabine National Wildlife Refuge using material dredged out of the Calcasieu River Ship Channel.	
Sabine Refuge Marsh Creation, Cycles 4 and 5	Cycles 4 and 5 consisted of the creation of 230 and 232 acres, respectively, of brackish marsh platform using material dredged from the Calcasieu River Ship Channel. Approximately 2 million cubic yards of material was placed within each of two marsh creation areas. The dredged material was contained by earthen dikes and low-level earthen overflow weirs that when constructed assist in the dewatering of the marsh creation disposal area. This also assists in the creation of fringe marsh through the overflow.	
Caminada Headland Beach and Dune Restoration	Recently constructed projects to restore and maintain the headland through creation of dunes and beach habitat.	<p>Short-term, adverse impacts:</p> <ul style="list-style-type: none"> ▪ Not applicable because the project is already constructed <p>Long-term, adverse impacts:</p> <ul style="list-style-type: none"> ▪ No applicable impacts identified <p>Long-term, positive impacts to:</p> <ul style="list-style-type: none"> ▪ Habitats ▪ Wildlife species ▪ Protected species ▪ Land and marine management ▪ Tourism and recreational use ▪ Aesthetics and visual resources ▪ Public health and safety, including flood and shoreline protection
Road Maintenance	<p>Past and potential future projects may include periodic road maintenance and road improvements on Louisiana State Highway 27 around Calcasieu Lake.</p> <hr/> <p>Past and potential future projects may include periodic road maintenance and road improvements on Elmer’s Island.</p>	<p>Short-term, adverse impacts to:</p> <ul style="list-style-type: none"> ▪ Geology and substrates ▪ Hydrology and water quality ▪ Habitats ▪ Wildlife species <p>Long-term, adverse impacts:</p> <ul style="list-style-type: none"> ▪ No applicable impacts identified <p>Long-term, positive impacts to:</p> <ul style="list-style-type: none"> ▪ Infrastructure ▪ Land and marine management ▪ Tourism and recreational use ▪ Aesthetics and visual resources ▪ Public health and safety, including flood and shoreline protection
Recreational Improvements	Potential future improvements may include additional recreational improvements to the Queen Bess site such as additional shuttle service, picnic areas, restrooms, and bird watching structures.	<p>Short-term, adverse impacts to:</p> <ul style="list-style-type: none"> ▪ Geology and substrates ▪ Habitats ▪ Wildlife species ▪ Protected species <p>Long-term, adverse impacts to:</p> <ul style="list-style-type: none"> ▪ Habitats ▪ Wildlife species ▪ Protected species <p>Long-term, positive impacts to:</p> <ul style="list-style-type: none"> ▪ Infrastructure ▪ Land and marine management ▪ Tourism and recreational use ▪ Aesthetics and visual resources

Section 5

Compliance with Other Laws and Regulations

In addition to the requirements of OPA and NEPA, other laws may apply to the proposed alternatives in the draft Phase 2 RP/EA #1.1. The LA TIG will ensure compliance with the following applicable laws or executive orders. Additional detail on each of these laws or executive orders can be found in Chapter 6 of the Final PDARP/PEIS (DHW Trustees 2016a). Additional federal laws may apply to the proposed alternatives considered in this draft Phase 2 RP/EA #1.1. Legal authorities applicable to restoration alternative development were fully described in the context of the DWH restoration planning in the Final PDARP/PEIS, Section 6.9 Compliance with Other Applicable Authorities and Appendix 6.D Other Laws and Executive Orders (DHW Trustees 2016a). That material is incorporated by reference here.

5.1 Federal Laws

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

- Endangered Species Act (16 U.S.C. §§ 1531 et seq.)
- Magnuson-Stevens Fishery Conservation and Management Act (16 U.S.C. §§ 1801 et seq.)
- Marine Mammal Protection Act (16 U.S.C. §§ 1361 et seq.)
- Coastal Zone Management Act (16 U.S.C. §§ 1451 et seq.)
- National Historic Preservation Act (16 U.S.C. §§ 470 et seq.)
- Coastal Barrier Resources Act (16 U.S.C. §§ 3501 et seq.)
- Migratory Bird Treaty Act (16 U.S.C. §§ 703 et seq.)
- Bald and Golden Eagle Protection Act (16 U.S.C. §§ 668 et seq.)
- Clean Air Act (42 U.S.C. §§ 7401 et seq.)
- Federal Water Pollution Control Act (Clean Water Act, 33 U.S.C. §§ 1251 et seq.)
- Rivers and Harbors Act (33 U.S.C. §§ 401 et seq.)
- Marine Protection, Research and Sanctuaries Act
- Archaeological Resource Protection Act
- National Marine Sanctuaries Act
- Farmland Protection Policy Act
- EO 11988: Floodplain Management (now as augmented by EO 13690, January 30, 2015)
- EO 11990: Protection of Wetlands
- EO 12898: Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations
- EO 12962: Recreational Fisheries
- EO 13112: Safeguarding the Nation from the Impacts of Invasive Species
- EO 13175: Consultation and Coordination with Indian Tribal Governments
- EO 13186: Responsibilities of Federal Agencies to Protect Migratory Birds
- EO 13693: Planning for Federal Sustainability in the Next Decade
- Fish and Wildlife Coordination Act (16 U.S.C §§ 661-666c)
- Estuary Protection Act

Federal environmental compliance responsibilities and procedures will follow the *Trustee Council Standard Operating Procedures for Implementation of the Natural Resource Restoration for the Deepwater Horizon (DWH) Oil Spill* (DWH Trustees 2016b). By following these standard operating procedures, the implementing Trustee for each project will ensure that the status of environmental compliance is tracked through the Restoration Portal. Implementing Trustees will keep a record of compliance documents and ensure they are submitted for inclusion to the Administrative Record.

5.2 Compliance with State and Local Laws

The LA TIG will ensure compliance with all applicable state and local laws and other applicable federal laws and regulations relevant to the State of Louisiana. Additional laws and regulations are listed below.

- Archeological Finds on State Lands (Louisiana Revised Statute [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 (Louisiana Administrative Code [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)

5.3 Compliance Summary and Next Steps

Following public review, the LA TIG intends to select a design alternative for completion and prepare for final design and construction. The LA TIG has started environmental compliance technical assistance and reviews with the applicable state and federal agencies. The LA TIG would ensure compliance reviews/approvals under all applicable state and local laws and other applicable federal laws and regulations relevant to the selected design alternative are complete before implementation. Implementing Trustees are required to implement alternative-specific mitigation measures (including BMPs) identified in this draft Phase 2 RP/EA #1.1 and completed consultations/permits. Implementing Trustees would provide oversight with regard to ensuring no unanticipated effects to listed species and habitats occur, including ensuring that BMPs are implemented and continue to function as intended. A summary of environmental compliance status will be provided in the Final Phase 2 RP/EA #1.1.

Section 6

Monitoring and Adaptive Management Plans and Operation and Management Plans

According to the NRDA regulations for OPA (15 CFR § 990.55), a restoration plan should include “a description of monitoring for documenting restoration effectiveness, including performance criteria that will be used to determine the success of restoration or need for interim corrective action.” Given the temporal, spatial, and funding scales associated with this draft Phase 2 RP/EA #1.1, the LA TIG recognizes the need for a robust monitoring and adaptive management framework to measure the beneficial impacts of restoration and support restoration decision-making. To increase the likelihood of successful restoration, the LA TIG would conduct the monitoring and evaluation needed to inform decision-making for current alternatives and refine the selection, design, and implementation of future restoration. This monitoring and adaptive management framework may be more robust for elements of the draft Phase 2 RP/EA #1.1 with higher degrees of uncertainty or where large amounts of restoration are planned within a given geographic area and/or for the benefit of a resource.

A monitoring plan and adaptive management plan was developed and is included in **Appendix B**. Monitoring and adaptive management plans include measurable objectives with associated performance standards to track progress toward restoration goals, methodologies and parameters for data collection, identification of key uncertainties, and tracking of compliance with appropriate regulations. An operation and maintenance plan also was developed and is included in **Appendix B**.

Section 7

List of Repositories

Table 7-1. List of Repositories

Library	Address	City	Zip
St. Tammany Parish Library	310 W. 21 st 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
Vermilion 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

Section 8

List of Preparers, Agencies, and Persons Consulted

Table 8-1. List of Preparers, Agencies, and Persons Consulted

Agency/Firm	Name	Position
State of Louisiana		
LDWF	Todd Baker	Coastal Resources Scientist Manager
LDWF	Casey Wright	Biologist
LDWF	Jon Wiebe	Program Manager – Oil Spill Program
CPRA	Annie Howard	CRS Supervisor, Environmental Section (NEPA)
CPRA	Matt Mumfrey	Attorney
CPRA	Katie Freer	Project Manager
National Oceanic and Atmospheric Association		
Restoration Center	Christina Fellas	DWH Environmental Compliance Coordinator/Biologist
Restoration Center	Ramona Schreiber	DWH NEPA Coordinator
Restoration Center/Earth Resources Technology	Courtney Schupp	Marine Habitat Resource Specialist
U.S. Department of Agriculture		
USDA NRCS	Ronald Howard	Program Specialist
USDA NRCS	Mark Defley	Biologist
U.S. Department of the Interior		
DOI	Benjamin Wilson	Science Policy Fellow
DOI	Robin Renn	DWH NEPA Coordinator
DOI	Erin Chandler	DWH Environmental Compliance Coordinator
DOI	Clare Cragan	Attorney
DOI	John Rudolph	Attorney
DOI	Kevin Reynolds	Designated Natural Resource Trustee Official – Louisiana Trustee Implementation Group
DOI	John Tirpak	Louisiana Restoration Area Coordinator
U.S. Environmental Protection Agency		
EPA	Tim Landers	Environmental Protection Specialist
EPA	Doug Jacobson	Environmental Protection Specialist, Louisiana Team Leader
Contractor Team		
CDM Smith	Brendan Brown	Senior Biologist
CDM Smith	Murray Wade	Senior Biologist
CDM Smith	Larry Schwartz	Biologist/Ecologist Specialist
CDM Smith	Matt Petty	Biologist/Ecologist Specialist
CDM Smith	Adam Khalaf	Biologist/Ecologist
CDM Smith	Traci Mordell	Technical Editor
CDM Smith	Kim Brotzge	Administrative

Section 9

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Appendix A

Guidelines for NEPA Impact Determinations in the Final PDARP/PEIS

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Table 6.3-2. Guidelines for NEPA impact determinations in the Final PDARP/PEIS.

Resource	Impact Duration	Impact Intensity Definitions		
		Minor	Moderate	Major
Physical Resources				
Geology and Substrates	<p><u>Short-term:</u> During construction period.</p> <p><u>Long-term:</u> Over the life of the project or longer.</p>	Disturbance to geologic features or soils could be detectable, but could be small and localized. There could be no changes to local geologic features or soil characteristics. Erosion and/or compaction could occur in localized areas.	Disturbance could occur over local and immediately adjacent areas. Impacts to geology or soils could be readily apparent and result in changes to the soil character or local geologic characteristics. Erosion and compaction impacts could occur over local and immediately adjacent areas.	Disturbance could occur over a widespread area. Impacts to geology or soils could be readily apparent and could result in changes to the character of the geology or soils over a widespread area. Erosion and compaction could occur over a widespread area. Disruptions to substrates or soils may be permanent.
Hydrology and Water Quality	<p><u>Short-term:</u> During construction period.</p> <p><u>Long-term:</u> Over the life of the project or longer.</p>	<p><u>Hydrology:</u> The effect on hydrology could be measurable, but it could be small and localized. The effect could only temporarily alter the area's hydrology, including surface and ground water flows.</p> <p><u>Water quality:</u> Impacts could result in a detectable change to water quality, but the change could be expected to be small and localized. Impacts could quickly become undetectable. State water quality standards as required by the Clean Water Act could not be exceeded.</p> <p><u>Floodplains:</u> Impacts may result in a detectable change to natural and beneficial floodplain values, but the change could be expected to be small, and localized. There could be no appreciable increased risk of flood loss including impacts on human safety, health, and welfare.</p> <p><u>Wetlands:</u> The effect on wetlands could be measurable but small in terms of area and the nature of the impact. A small impact on the size, integrity, or</p>	<p><u>Hydrology:</u> The effect on hydrology could be measurable, but small and limited to local and adjacent areas. The effect could permanently alter the area's hydrology, including surface and ground water flows.</p> <p><u>Water quality:</u> Effects to water quality could be observable over a relatively large area. Impacts could result in a change to water quality that could be readily detectable and limited to local and adjacent areas. Change in water quality could persist; however, it could likely not exceed state water quality standards as required by the Clean Water Act.</p> <p><u>Floodplains:</u> Impacts could result in a change to natural and beneficial floodplain values and could be readily detectable, but limited to local and adjacent areas. Location of operations in floodplains could increase risk of flood loss, including impacts on human safety, health, and welfare.</p>	<p><u>Hydrology:</u> The effect on hydrology could be measurable and widespread. The effect could permanently alter hydrologic patterns including surface and ground water flows.</p> <p><u>Water quality:</u> Impacts could likely result in a change to water quality that could be readily detectable and widespread. Impacts could likely result in exceedance of state water quality standards and/or could impair designated uses of a water body.</p> <p><u>Floodplains:</u> Impacts could result in a change to natural and beneficial floodplain values that could have substantial consequences over a widespread area. Location of operations could increase risk of flood loss, including impacts on human safety, health, and welfare.</p> <p><u>Wetlands:</u> The action could cause a permanent loss of wetlands across a widespread area. The character of the wetlands could be changed so that the functions typically provided by the wetland could be permanently lost.</p>

		Impact Intensity Definitions		
Resource	Impact Duration	Minor	Moderate	Major
		connectivity could occur; however, wetland function could not be affected and natural restoration could occur if left alone.	<u>Wetlands</u> : The action could cause a measurable effect on wetlands indicators (size, integrity, or connectivity) or could result in a permanent loss of wetland acreage across local and adjacent areas. However, wetland functions could only be permanently altered in limited areas.	
Air Quality	<u>Short-term</u> : During construction period. <u>Long-term</u> : Over the life of the project or longer.	The impact on air quality may be measurable, but could be localized and temporary, such that the emissions do not exceed the Environmental Protection Agency's (EPA's) <i>de minimis</i> criteria for a general conformity determination under the Clean Air Act (40 CFR § 93.153).	The impact on air quality could be measurable and limited to local and adjacent areas. Emissions of criteria pollutants could be at EPA's <i>de minimis</i> criteria levels for general conformity determination.	The impact on air quality could be measurable over a widespread area. Emissions are high, such that they could exceed EPA's <i>de minimis</i> criteria for a general conformity determination.
Noise	<u>Short-term</u> : During construction period. <u>Long-term</u> : Over the life of the project.	Increased noise could attract attention, but its contribution to the soundscape would be localized and unlikely to affect current user activities.	Increased noise could attract attention and contribute to the soundscape including in local areas and those adjacent to the action, but could not dominate. User activities could be affected.	Increased noise could attract attention and dominate the soundscape over widespread areas. Noise levels could eliminate or discourage user activities.
Biological Resources				
Habitats	<u>Short-term</u> : Lasting less than two growing seasons. <u>Long-term</u> : Lasting longer than two growing seasons.	Impacts on native vegetation may be detectable, but could not alter natural conditions and could be limited to localized areas. Infrequent disturbance to individual plants could be expected, but would not affect local or range-wide population stability. Infrequent or insignificant one-time disturbance to locally suitable habitat could occur, but sufficient habitat could remain functional at both the local and regional scales to maintain the viability of the species. Opportunity for increased spread of non-native species could be detectable but	Impacts on native vegetation could be measurable but limited to local and adjacent areas. Occasional disturbance to individual plants could be expected. These disturbances could affect local populations negatively but could not be expected to affect regional population stability. Some impacts might occur in key habitats, but sufficient local habitat could retain function to maintain the viability of the species both locally and throughout its range. Opportunity for increased spread of non-native species could be detectable and	Impacts on native vegetation could be measurable and widespread. Frequent disturbances of individual plants could be expected, with negative impacts to both local and regional population levels. These disturbances could negatively affect range-wide population stability. Some impacts might occur in key habitats, and habitat impacts could negatively affect the viability of the species both locally and throughout its range. Actions could result in the widespread increase of non-native species, resulting in broad and permanent changes to native

		Impact Intensity Definitions		
Resource	Impact Duration	Minor	Moderate	Major
		temporary and localized and could not displace native species populations and distributions.	limited to local and adjacent areas, but could only result in temporary changes to native species population and distributions.	species populations and distributions.
Wildlife Species (Including Birds)	<p><u>Short-term</u>: Lasting up to two breeding seasons, depending on length of breeding season.</p> <p><u>Long-term</u>: Lasting more than two breeding seasons.</p>	<p>Impacts to native species, their habitats, or the natural processes sustaining them could be detectable, but localized, and could not measurably alter natural conditions. Infrequent responses to disturbance by some individuals could be expected, but without interference to feeding, reproduction, resting, migrating, or other factors affecting population levels. Small changes to local population numbers, population structure, and other demographic factors could occur. Sufficient habitat could remain functional at both the local and range-wide scales to maintain the viability of the species.</p> <p>Opportunity for increased spread of non-native species could be detectable but temporary and localized, and these species could not displace native species populations and distributions.</p>	<p>Impacts on native species, their habitats, or the natural processes sustaining them could be measureable but limited to local and adjacent areas. Occasional responses to disturbance by some individuals could be expected, with some negative impacts to feeding, reproduction, resting, migrating, or other factors affecting local population levels. Some impacts might occur in key habitats. However, sufficient population numbers or habitat could retain function to maintain the viability of the species both locally and throughout its range.</p> <p>Opportunity for increased spread of non-native species could be detectable and limited to local and adjacent areas, but could only result in temporary changes to native species population and distributions.</p>	<p>Impacts on native species, their habitats, or the natural processes sustaining them could be detectable and widespread. Frequent responses to disturbance by some individuals could be expected, with negative impacts to feeding, reproduction, migrating, or other factors resulting in a decrease in both local and range-wide population levels and habitat type. Impacts could occur during critical periods of reproduction or in key habitats and could result in direct mortality or loss of habitat that might affect the viability of a species. Local population numbers, population structure, and other demographic factors might experience large changes or declines.</p> <p>Actions could result in the widespread increase of non-native species resulting in broad and permanent changes to native species populations and distributions.</p>
Marine and Estuarine Fauna (Fish, Shellfish, Benthic Organisms)	<p><u>Short-term</u>: Lasting up to two spawning seasons, depending on length of season.</p> <p><u>Long-term</u>: Lasting more than two spawning seasons.</p>	<p>Impacts could be detectable and localized but small. Disturbance of individual species could occur; however, there could be no change in the diversity or local populations of marine and estuarine species. Any disturbance could not interfere with key behaviors such as feeding and spawning. There could be no restriction of movements daily or seasonally.</p> <p>Opportunity for increased spread of non-native species could be detectable but</p>	<p>Impacts could be readily apparent and result in a change in marine and estuarine species populations in local and adjacent areas. Areas being disturbed may display a change in species diversity; however, overall populations could not be altered. Some key behaviors could be affected but not to the extent that species viability is affected. Some movements could be restricted seasonally.</p> <p>Opportunity for increased spread of non-</p>	<p>Impacts could be readily apparent and could substantially change marine and estuarine species populations over a wide-scale area, possibly river-basin-wide. Disturbances could result in a decrease in fish species diversity and populations. The viability of some species could be affected. Species movements could be seasonally constrained or eliminated.</p> <p>Actions could result in the widespread increase of non-native species resulting in broad and permanent changes to native</p>

		Impact Intensity Definitions		
Resource	Impact Duration	Minor	Moderate	Major
		temporary and localized and these species could not displace native species populations and distributions.	native species could be detectable and limited to local and adjacent areas, but could only result in temporary changes to native species population and distributions.	species populations and distributions.
Protected Species	<p><u>Short-term</u>: Lasting up to one breeding/growing season.</p> <p><u>Long-term</u>: Lasting more than one breeding/growing season.</p>	Impacts on protected species, their habitats, or the natural processes sustaining them could be detectable, but small and localized, and could not measurably alter natural conditions. Impacts could likely result in a “may affect, not likely to adversely affect” determination for at least one listed species.	Impacts on protected species, their habitats, or the natural processes sustaining them could be detectable and some alteration in the numbers of protected species or occasional responses to disturbance by some individuals could be expected, with some negative impacts to feeding, reproduction, resting, migrating, or other factors affecting local and adjacent population levels. Impacts could occur in key habitats, but sufficient population numbers or habitat could remain functional to maintain the viability of the species both locally and throughout their range. Some disturbance to individuals or impacts to potential or designated critical habitat could occur. Impacts could likely result in a “may affect, likely to adversely affect” determination for at least one listed species. No adverse modification of critical habitat could be expected.	Impacts on protected species, their habitats, or the natural processes sustaining them could be detectable, widespread, and permanent. Substantial impacts to the population numbers of protected species, or interference with their survival, growth, or reproduction could be expected. There could be impacts to key habitat, resulting in substantial reductions in species numbers. Results in an “is likely to jeopardize proposed or listed species/adversely modify proposed or designated critical habitat (impairment)” determination for at least one listed species.

Resource	Impact Duration	Impact Intensity Definitions		
		Minor	Moderate	Major
Socioeconomic Resources				
Socioeconomic and Environmental Justice^a	<p><u>Short-term:</u> During construction period.</p> <p><u>Long-term:</u> Over the life of the project or longer.</p>	<p>A few individuals, groups, businesses, properties, or institutions could be affected. Impacts could be small and localized. These impacts are not expected to substantively alter social and/or economic conditions.</p> <p>Actions could not disproportionately affect minority and low-income populations.</p>	<p>Many individuals, groups, businesses, properties, or institutions could be affected. Impacts could be readily apparent and detectable in local and adjacent areas and could have a noticeable effect on social and/or economic conditions.</p> <p>Actions could disproportionately affect minority and low-income populations. However, the impact could be temporary and localized.</p>	<p>A large number of individuals, groups, businesses, properties, or institutions could be affected. Impacts could be readily detectable and observed, extend over a widespread area, and have a substantial influence on social and/or economic conditions.</p> <p>Actions could disproportionately affect minority and low-income populations, and this impact could be permanent and widespread.</p>
Cultural Resources	<p><u>Short-term:</u> During construction period.</p> <p><u>Long-term:</u> Over the life of the project or longer.</p>	<p>The disturbance of a site(s), building, structure, or object could be confined to a small area with little, if any, loss of important cultural information potential.</p>	<p>Disturbance of a site(s), building, structure, or object not expected to result in a substantial loss of important cultural information.</p>	<p>Disturbance of a site(s), building, structure, or object could be substantial and may result in the loss of most or all its potential to yield important cultural information.</p>
Infrastructure	<p><u>Short-term:</u> During construction period.</p> <p><u>Long-term:</u> Over the life of the project or longer.</p>	<p>The action could affect public services or utilities but the impact could be localized and within operational capacities.</p> <p>There could be negligible increases in local daily traffic volumes resulting in perceived inconvenience to drivers but no actual disruptions to traffic.</p>	<p>The action could affect public services or utilities in local and adjacent areas and the impact could require the acquisition of additional service providers or capacity.</p> <p>Detectable increase in daily traffic volumes (with slightly reduced speed of travel), resulting in slowed traffic and delays, but no change in level of service (LOS). Short service interruptions (temporary closure for a few hours) to roadway and railroad traffic could occur.</p>	<p>The action could affect public services or utilities over a widespread area resulting in the loss of certain services or necessary utilities.</p> <p>Extensive increase in daily traffic volumes (with reduced speed of travel) resulting in an adverse change in LOS to worsened conditions. Extensive service disruptions (temporary closure of one day or more) to roadways or railroad traffic could occur.</p>
Land and Marine Management	<p><u>Short-term:</u> During construction period.</p> <p><u>Long-term:</u> Over the life of the project or longer.</p>	<p>The action could require a variance or zoning change or an amendment to a land use, area comprehensive, or management plan, but could not affect overall use and management beyond the local area.</p>	<p>The action could require a variance or zoning change or an amendment to a land use, area comprehensive, or management plan, and could affect overall land use and management in local and adjacent areas.</p>	<p>The action could cause permanent changes to and conflict with land uses or management plans over a widespread area.</p>

		Impact Intensity Definitions		
Resource	Impact Duration	Minor	Moderate	Major
Tourism and Recreational Use	<p><u>Short-term</u>: During construction period.</p> <p><u>Long-term</u>: Over the life of the project or longer.</p>	<p>There could be partial developed recreational site closures to protect public safety. The same site capacity and visitor experience could remain unchanged after construction.</p> <p>The impact could be detectable and/or could only affect some recreationists. Users could likely be aware of the action but changes in use could be slight. There could be partial closures to protect public safety. Impacts could be local.</p> <p>There could be a change in local recreational opportunities; however, it could affect relatively few visitors or could not affect any related recreational activities.</p>	<p>There could be complete site closures to protect public safety. However, the sites could be reopened after activities occur. There could be slightly reduced site capacity. The visitor experience could be slightly changed but still available.</p> <p>The impact could be readily apparent and/or could affect many recreationists locally and in adjacent areas. Users could be aware of the action. There could be complete closures to protect public safety. However, the areas could be reopened after activities occur. Some users could choose to pursue activities in other available local or regional areas.</p>	<p>All developed site capacity could be eliminated because developed facilities could be closed and removed. Visitors could be displaced to facilities over a widespread area and visitor experiences could no longer be available in many locations.</p> <p>The impact could affect most recreationists over a widespread area. Users could be highly aware of the action. Users could choose to pursue activities in other available regional areas.</p>
Fisheries and Aquaculture	<p><u>Short-term</u>: During construction period.</p> <p><u>Long-term</u>: Over the life of the project or longer.</p>	<p>A few individuals, groups, businesses, properties, or institutions could be affected. Impacts could be small and localized. These impacts are not expected to substantively alter social and/or economic conditions.</p>	<p>Many individuals, groups, businesses, properties, or institutions could be affected. Impacts could be readily apparent and detectable in local and adjacent areas and could have a noticeable effect on social and/or economic conditions.</p>	<p>A large number of individuals, groups, businesses, properties, or institutions could be affected. Impacts could be readily detectable and observed, extend over a widespread area, and could have a substantial influence on social and/or economic conditions.</p>
Marine Transportation	<p><u>Short-term</u>: During construction period.</p> <p><u>Long-term</u>: Over the life of the project or longer.</p>	<p>The action could affect public services or utilities, but the impact could be localized and within operational capacities.</p> <p>There could be negligible increases in local daily marine traffic volumes, resulting in perceived inconvenience to operators but no actual disruptions to transportation.</p>	<p>The action could affect public services or utilities in local and adjacent areas, and the impact could require the acquisition of additional service providers or capacity.</p> <p>Detectable increase in daily marine traffic volumes could occur (with slightly reduced speed of travel), resulting in slowed traffic and delays. Short service interruptions could occur (temporary delays for a few hours).</p>	<p>The action could affect public services or utilities over a widespread area resulting in the loss of certain services or necessary utilities.</p> <p>Extensive increase in daily marine traffic volumes could occur (with reduced speed of travel), resulting in extensive service disruptions (temporary closure of one day or more).</p>

		Impact Intensity Definitions		
Resource	Impact Duration	Minor	Moderate	Major
Aesthetics and Visual Resources	<p><u>Short-term</u>: During construction period.</p> <p><u>Long-term</u>: Over the life of the project or longer.</p>	There could be a change in the view shed that was readily apparent but could not attract attention, dominate the view, or detract from current user activities or experiences.	There could be a change in the view shed that was readily apparent and attracts attention. Changes could not dominate the viewscape, although they could detract from the current user activities or experiences.	Changes to the characteristic views could dominate and detract from current user activities or experiences.
Public Health and Safety, Including Flood and Shoreline Protection	<p><u>Short-term</u>: During construction period.</p> <p><u>Long-term</u>: Over the life of the project or longer.</p>	<p>Actions could not result in 1) soil, ground water, and/or surface water contamination; 2) exposure of contaminated media to construction workers or transmission line operations personnel; and/or 3) mobilization and migration of contaminants currently in the soil, ground water, or surface water at levels that could harm the workers or general public.</p> <p>Increased risk of potential hazards (e.g., increased likelihood of storm surge) to visitors, residents, and workers from decreased shoreline integrity could be temporary and localized.</p>	<p>Project construction and operation could result in 1) exposure, mobilization and/or migration of existing contaminated soil, ground water, or surface water to an extent that requires mitigation; and/or 2) could introduce detectable levels of contaminants to soil, ground water, and/or surface water in localized areas within the project boundaries such that mitigation/remediation is required to restore the affected area to the preconstruction conditions.</p> <p>Increased risk of potential hazards to visitors, residents, and workers from decreased shoreline integrity could be sufficient to cause a permanent change in use patterns and area avoidance in local and adjacent areas.</p>	<p>Actions could result in 1) soil, ground water, and/or surface water contamination at levels exceeding federal, state, or local hazardous waste criteria, including those established by 40 CFR § 261; 2) mobilization of contaminants currently in the soil, ground water, or surface water, resulting in exposure of humans or other sensitive receptors such as plants and wildlife to contaminant levels that could result in health effects; and 3) the presence of contaminated soil, ground water, or surface water within the project area, exposing workers and/or the public to contaminated or hazardous materials at levels exceeding those permitted by the federal Occupational Safety and Health Administration (OSHA) in 29 CFR § 1910.</p> <p>Increased risk of potential hazards to visitors, residents, and workers from decreased shoreline integrity could be substantial and could cause permanent changes in use patterns and area avoidance over a widespread area.</p>

^a Evaluation of potential environmental justice issues will be fully address in future tiered documents.

Appendix B

Monitoring and Adaptive Management Plans and Operation, Maintenance, and Rehabilitation Plans

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Appendix B1

Monitoring and Adaptive Management Plan for Deepwater Horizon NRDA Project: Queen Bess Island Restoration Project

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Appendix B1 – Monitoring and Adaptive
Management Plan for Deepwater Horizon NRDA
Project: Queen Bess Island Restoration Project

1. Introduction

The Deepwater Horizon (DWH) Louisiana Trustee Implementation Group (LA TIG) developed this monitoring and adaptive management plan (MAM plan) for the Queen Bess Island (BA-0202) Restoration Project (the Project), which represents one of six projects selected from within the broader *Final Restoration Plan #1: Restoration of Wetlands, Coastal, and Nearshore Habitats; Habitat Projects on Federally Managed Lands; and Birds* (RP) in January 2017. The purpose of this MAM plan is to identify monitoring activities that will be conducted to evaluate and document restoration effectiveness, including performance criteria for determining restoration success or need for interim corrective action (15 Code of Federal Regulations [CFR] 990.55(b)(1)(vii)). Where applicable, the MAM plan identifies key sources of uncertainty and incorporates monitoring data and decision points that address these uncertainties. It also establishes a decision-making process for making adjustments where needed.

There are three primary purposes for MAM plans:

1. Identify and document how restoration managers will measure and track progress toward achieving restoration goals and objectives
2. Before a project begins, increase the likelihood of successful implementation through identification of potential corrective actions that could be undertaken if the project does not proceed as expected
3. In a systematic way, ensure the capture of lessons learned or new information acquired that can be incorporated into future project selection, design, and implementation

The MAM plan is a living document and may be updated as needed to reflect changing conditions and/or new information. For example, the MAM plan may need to be revised should the project design change, if initial data analysis indicates that the sampling design requires adjustment, or if any existing uncertainties are resolved or new uncertainties are identified during project implementation and monitoring. Any future revisions to the MAM plan will be made available through the Restoration Portal (<https://www.diver.orr.noaa.gov/web/guest/home>) and accessible through the DWH Natural Resource Damage Assessment (NRDA) Trustees' website (<http://www.restoration.noaa.gov/dwh/storymap/>).

1.1 Project Overview

The Queen Bess Island (BA-0202) Restoration Project is located within the Barataria Hydrologic Basin in Jefferson Parish, Louisiana (**Figure 1**). This island represents one of the northern Gulf of Mexico's most productive colonial waterbird (CWB) colonies and was significantly impacted by the spill (e.g., extensive impacts to CWBs [all age classes] and their nesting and brooding habitats) (Remsen, Jr. et al. 2015; Baker et al. 2015). In response, the LA TIG proposed the selection of the Project as one means to restore for these impacted bird resources.

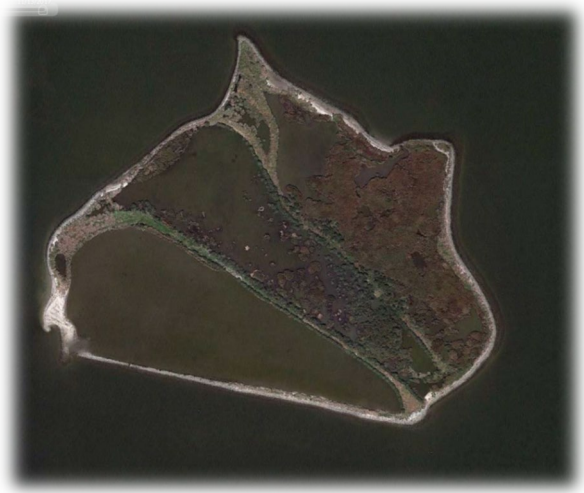


Figure 1. Queen Bess Island. Jefferson Parish, Louisiana. Google Earth, 11/13/17

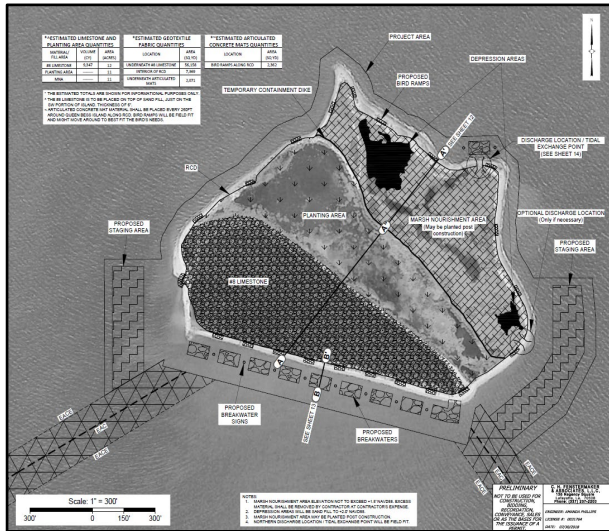


Figure 2. Proposed Restoration Design for Queen Bess Island

The Project will be accomplished by depositing suitable imported sediment sources within the island's enhanced rock ring. Following construction and dewatering activities, the island will be planted (Cells 1, 2, and select portions of Cell 3) with suitable native vegetation such as smooth cordgrass (*Spartina alterniflora*), wire grass (*Spartina patens*), marsh elder (*Iva frutescens*), matrimony vine (*Lycium barbarum*) and black mangrove (*Avicennia germinans*). Further, small limestone will be deposited (principally within Cell 3) with the intent of creating a low maintenance, beach-like feature for the enhancement of tern and black skimmer (*Rynchops niger*) nesting opportunities (Figure 2).

The Project is being implemented as restoration for the DWH oil spill NRDA, consistent with the *Deepwater Horizon Oil Spill: Final Programmatic Damage Assessment and Restoration Plan and Final Programmatic Environmental Impact Statement* and the *Deepwater Horizon Oil Spill Natural Resource Damage Assessment Strategic Framework for Bird Restoration Activities* (the Framework).

- Programmatic Goal: Replenish and protect living coastal and marine resources
- Restoration Type: Birds
- Restoration Approaches: Restore and conserve bird nesting and foraging habitat; create, restore, and enhance barrier and coastal islands and headlands
- Restoration Techniques: Restore or construct barrier and coastal islands and headlands via placement of dredged sediments; enhance habitat through vegetation management; construct groins, breakwaters, or use sediment bypass methods
- Trustee Implementation Group: LA TIG

The implementing agency is State of Louisiana in partnership with the U.S. Fish and Wildlife Service (USFWS).

1.2 Restoration Type Goals and Project Restoration Objectives

The Project's primary goal is to create and/or enhance Queen Bess Island's current suitable colonial waterbird nesting and brood-rearing habitat (presently less than 5 acres) to ~36 acres¹ with an anticipated habitat breakdown as follows: brown pelican (*Pelecanus occidentalis*) and wading birds (~22 acres), and terns (primarily *Sterna spp.* and *Thalasseus spp.*) and black skimmers (~12 acres). In so doing, Trustees envision the Project will generate additional CWB

¹ Total project acreage (36 acres) consists of 34 acres of CWB nesting and brooding habitats and 2 acres of rock containment dike.

nesting opportunities that will compensate, in part, for bird losses associated with the spill. Specific project restoration type goals are identified below:

Restoration Type Goals

- Restore lost birds by facilitating additional production and/or reduced mortality of injured bird species
- Restore and protect habitats on which injured birds rely
- Restore injured birds by species where actions would provide the greatest benefits within geographic ranges that include the Gulf of Mexico

In achieving these identified restoration type goals, Trustees will accomplish the Project's principal restoration objectives.

Restoration Objectives

Objective #1: Restore/Create Queen Bess Island habitat for utilization of brown pelicans, gulls, wading birds, terns, and black skimmer nesting activity

- Parameter #1: Area of potential nesting habitat for brown pelicans and/or wading birds
- Parameter #2: Area of potential nesting habitat for terns and skimmers

Objective #2: Support nesting activity for brown pelicans, gulls, wading birds, terns, and black skimmer that contributes to making the environment and the public whole for spill-related injuries

- Parameter #3: CWB nesting activity

While the primary project goal is well defined, it is acknowledged that the restoration plan is conceptual. Throughout the design process, project team members, including the Coastal Protection and Restoration Authority (CPRA), the Louisiana Department of Wildlife and Fisheries (LDWF), and the USFWS will have the opportunity to refine design parameters as additional information becomes available.

Performance criteria will be identified/implemented to determine restoration success or the need for corrective action in accordance with 15 CFR 990.55(b)(1)(vii)). Specific, measurable performance criteria are defined for monitoring parameters associated with each of the restoration objectives in Section 5.0.

1.3 Conceptual Setting

The purpose of the conceptual setting within the MAM plan is to identify, document, and communicate interactions and linkages among system components at the project site and to understand how these system works may be affected by the associated restoration (see MAM Manual) (**Table 1**).

Table 1. Conceptual Model for Queen Bess Island (BA-0202) Restoration Project

Restoration Actions	As-Built	Interim	Restoration Goal
<ul style="list-style-type: none"> ▪ Place suitable imported sediments within an enhanced rock ring that surrounds the island 	<ul style="list-style-type: none"> ▪ Create or enhance ~34 acres of CWB nesting and brooding habitat 	<ul style="list-style-type: none"> ▪ Suitable imported sediments compact and dewater to desired elevation for targeted CWB nesting and brooding habitat ▪ Planted native vegetation survives and expands to achieve desired species composition and percent cover, which supports CWB nesting and brooding opportunities ▪ Beach-like feature within Cell 3 to achieve desired elevation and lack of vegetation, which supports tern and black skimmer nesting and brooding opportunities 	<ul style="list-style-type: none"> ▪ Newly constructed habitat attracts desired CWB species (brown pelican, wading birds, gull, tern, and black skimmer) for nesting and brooding opportunities. ▪ Newly constructed habitat has a 20-year lifespan. ▪ Balance cost, quality, and urgency effectively. ▪ Provide ecological services that contribute to making the environment and the public whole for spill-related injuries to these resources.

1.3.1 Potential Sources of Uncertainty

Potential uncertainties are defined as those that may affect the ability to achieve stated project restoration objective(s). To aid in the identification of uncertainties, Trustees utilized a variety of sources, including but not limited to Strategic Framework for Bird Restoration Activities, PDARP/PEIS Restoration Type MAM sections, Monitoring and Adaptive Management Procedures and Guidelines Manual Version 1.0, DWH injury assessment technical reports, and other documents. Select monitoring activities can then be implemented to inform these uncertainties and to select appropriate corrective actions in the event the Project is not meeting its performance criteria (**Table 2**). Potential options to address key uncertainties may be found in the Framework and other sources.

Table 2. Key Uncertainties

Reference Number	Key Uncertainty	Description on How the Uncertainty Could Impact Project Success and/or Decision-Making
1	Contractor completing the Project on time	Contractor’s inability to complete the Project within the designated time frame would delay resource restoration and require allocation of additional resources for project completion.
2	Availability of suitable nesting habitat within the Northern Gulf of Mexico	There are several restoration activities that are taking place across coastal Louisiana and the northern Gulf Coast. Many of these projects could provide habitat for nesting birds, especially black skimmers and terns. This additional amount and diversity of potentially high-quality habitat could lower the number of nesting birds on Queen Bess Island, reducing the apparent short-term effectiveness of the Project. Potential options to address this uncertainty include but are not limited to social attraction techniques.
3	Suitability of restored island to mammalian nest predators	The presence of mammalian predators within CWB colonies has been shown to be highly detrimental to nesting success and hatchling/fledgling survival. Potential options to address this uncertainty include but are not limited to predator removal or colony fencing to reduce/eliminate access by mammalian predators.
4	Success of vegetation plantings	Lack of planting success would limit creation of preferred nesting habitat (i.e., vertical structure) for many CWB species. This would result in lower quality, or lack of suitable, habitat for brown pelican and a number of wading bird species (e.g., great egrets, reddish egrets, and tricolored herons).
5	Colonization of the island by invasive vegetative species such as Roseau cane (<i>Phragmites australis</i>) and/or Chinese tallow (<i>Triadica sebifera</i>)	Colonization by non-native plant species could result in habitat that is less preferred by CWB for nesting and brooding and would therefore not support proposed project objective (i.e., increase CWB nesting opportunities). Potential options to address this uncertainty include but are not limited to utilization of chemical, mechanical, or other removal techniques.
6	Extreme weather events such as hurricanes, tropical storms, and droughts	Effects of these ephemeral events have been shown to cause mortality in all CWB mortality in all age classes (adults, juveniles, young of the year) as well as loss of critical nesting and brooding habitats.
7	Anthropogenic disturbance	Anthropogenic disturbance has been shown to significantly impact CWB nesting success and hatchling/fledgling survival via limiting parental attendance. Potential options to address this uncertainty include but are not limited to signage indicating restricted distance to colonies at certain times of the year, law enforcement, or other methods.
8	Avian disease	Occurrence of avian disease has the potential to harm all CWB age classes (adults, juveniles, young of the year) and could result in colony failure. Potential options to address this uncertainty include but are not limited to creation or enhancement of additional CWB islands to reduce bird densities and thereby prevalence of disease presence and frequency.

2. Project Monitoring

The MAM plan was developed to evaluate project performance, key uncertainties, and potential corrective actions, if needed. For each of the identified monitoring parameters, information is provided as to their intended purpose (e.g., monitor progress toward meeting one or more of the restoration objectives, regulatory compliance, support adaptive management of the project),

monitoring methods, timing and frequency, duration, sample size, and sites. Further, these parameters will be monitored to demonstrate how the restoration project is trending toward the performance criteria and to inform the need for corrective actions (see Section 5, Project-Level Decisions).

Though additional measures may be implemented to more fully characterize the Project's effectiveness, the LA TIG proposes the continued implementation of proven and established monitoring methodologies:

Objective #1: Restore/Create Queen Bess Island habitat for the utilization of brown pelicans, terns, skimmers, and wading bird nesting activity

Parameter #1: Area of potential nesting habitat for brown pelicans and/or wading birds

- a) Purpose: This parameter will be used to inform Year 3 planting and invasive plant removal and to inform post-execution adaptive management.
- b) Method: Determine the amount (acreage) of habitat that is suitable for nesting of each of the targeted avian species/groups. This will be the result of a complex analysis of plant species composition and percent cover (including overall total cover, total cover by herbaceous species and/or shrubs, percent cover of key species, and/or average height of dominant/key species) using several data types, including:
 - High-resolution, near-vertical aerial imagery
 - Real-time kinematic (RTK) survey positioning
 - Ground surveys utilizing the Braun-Blanquet method (Mueller-Dombois and Ellenberg 1974) to validate imagery
- c) Timing, Frequency, and Duration: Fall years 2, 5, and 10.
- d) Sample Size: A minimum of 20 randomly selected vegetation stations. Exact number of stations will be determined from power analyses.
- e) Sites: Vegetation stations will be established interior to the perimeter rock containment dike at randomly selected locations in the areas designed for brown pelicans and/or wading bird nesting per the construction design drawings.

Parameter #2: Area of potential nesting habitat for terns and skimmers

- a) Purpose: This parameter will be used to inform Year 3 vegetation removal and limestone supplementation and to inform post-execution adaptive management.
- b) Method: Determine the amount (acreage) of habitat that is suitable for nesting and brooding for each of the targeted avian species/guilds. This will be the result of an analysis (emergent vegetation presence or absence, emergent vegetation at or below 10 percent of total area) using several data types, including:
 - High-resolution, near-vertical aerial imagery
 - RTK survey positioning
 - Ground surveys utilizing the Braun-Blanquet method (Mueller-Dombois and Ellenberg 1974) to validate imagery
- c) Timing, Frequency, and Duration: Fall years 2, 5, and 10.

- d) **Sample Size:** A minimum of 10 randomly selected stations. Exact number of stations will be determined from power analyses.
- e) **Sites:** Stations will be established along or in the vicinity of topographic transects previously established by the Project within the interior of the perimeter rock containment dike in areas designated as tern and skimmer habitat per the construction design drawings.

Objective #2: Support nesting activity for brown pelicans, terns, skimmers, and wading birds that contributes to making the environment and the public whole for spill-related injuries

Parameter #3: CWB nesting activity

- a) **Purpose:** This parameter will be used to evaluate the effectiveness of the Project in increasing nesting of the targeted species (Framework, Appendix A, Colonial Waterbirds) and to inform adaptive management.
- b) **Method:**
 - Acquire high-resolution aerial digital photography of CWB nest surveys on Queen Bess Island utilizing established methodologies (Ford 2010; Appendix A).
 - Photographic counting (also known as Dotting) of acquired high-resolution aerial digital photography during CWB surveys will be used to estimate numbers of nests for brown pelicans, terns, skimmers, gulls, and wading birds on Queen Bess Island (Ford 2010; Appendix B).
- c) **Timing, Frequency, and Duration:** Surveys will be conducted during pre-execution and Years 1, 3, 5, and 10. Due to the bimodal nature of the CWB nesting season, two representative surveys will be implemented for each of the years indicated: the initial survey (mid-May) followed by the final survey (mid-June). This timing will follow previous aerial photo nest survey windows conducted in 2010 to 2013 and 2018 in Louisiana.
- d) **Sample Size:** The entire island will be photographed, and associated images will be analyzed for nests generated by species or guild.
- e) **Site:** Queen Bess Island.

3. Adaptive Management

Monitoring information collected at the project level can also inform adaptive management (a form of structured decision-making applied to the management of natural resources in the face of uncertainty of that individual project) (Pastorok et al. 1997; Williams 2011). Within the LA TIG, an adaptive management framework has been developed that identifies and characterizes the four main phases and is illustrated within a representative management cycle (see Figure3).

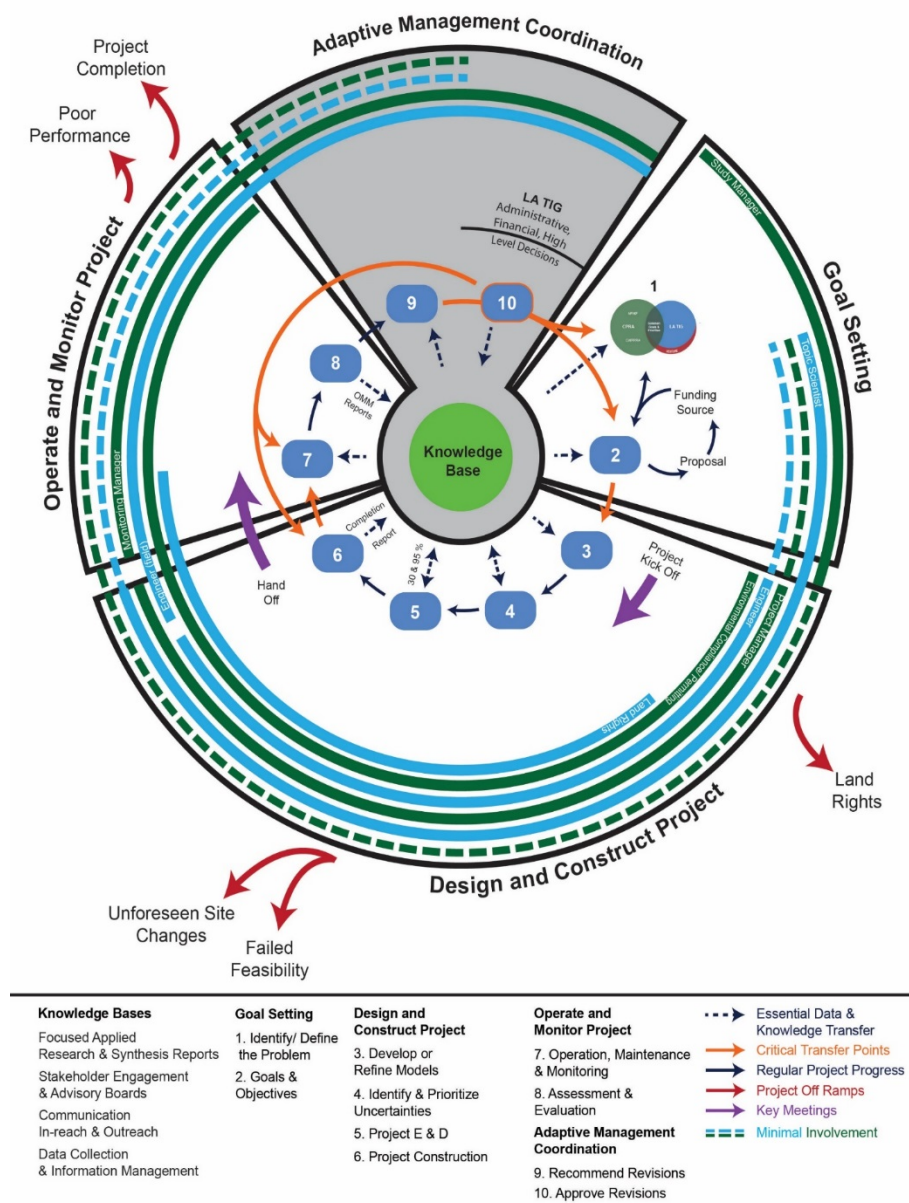


Figure 3. LA TIG Adaptive Management Cycle

1. Goal-Setting Phase: Problem is identified or defined and project goals and objectives are established based on multiple sources, including lessons learned, data and associated synthesis, and applied research from previous projects and from the knowledge base as a whole.
2. Development and Execution Phase: Project advances through select steps, including model development or refinement, identification and prioritization of uncertainties, plan formulation, engineering, design, and project construction.
3. Monitoring and Performance Phase: Project's operations, maintenance, and monitoring plans are developed and project assessment and evaluation criteria are identified.
4. Adaptive Management Coordination Phase: Encompasses steps for recommending and approving project revisions so that revisions can achieve one or both of the following:

- Result in alterations and redesign of project elements or changes to project operation
- Provide input to either the understanding of the overall problem statements or the refinement of attainable or realistic goals and objectives for future projects

Where gaps in scientific understanding exist, project information collected (see Section 2, Project Monitoring) and evaluated (see Section 4, Evaluation) may be utilized by the LA TIG to reduce key uncertainties and/or other analyses that inform the selection, design, and optimization of future restoration projects (Framework).

4. Evaluation

Evaluation of monitoring data is needed to assess the project implementation and performance in meeting restoration objectives, resolving uncertainties to increase understanding, and determining whether corrective actions are needed.

As part of the larger decision-making context, the evaluation of monitoring data from individual projects could also be compiled and assessed at the restoration type and LA TIG level, and the results would be used to update the knowledge base to inform decisions such as future LA TIG project prioritization and selection, implementation techniques, and the identification of critical uncertainties.

The results of these analyses would be used to answer the following questions:

- Were the project restoration objectives achieved? If not, is there a reason why they were not met?
- Did the restoration project produce unanticipated effects?
- Were there unanticipated events unrelated to the restoration project that potentially affected the monitoring results (e.g., hurricanes)?
- Were any of the uncertainties identified prior to project implementation resolved?
- Were any new uncertainties identified?

Proposed analysis methods for monitoring parameters are grouped under stated objective headings and will be updated as necessary:

Objective #1: Restore/Create Queen Bess Island habitat for utilization of brown pelicans, terns, skimmers, and wading bird nesting activity

Analysis: Vegetative Structure and Composition: General descriptive statistical analyses may include but are not limited to averages/means of the overall total cover and total cover by herbaceous species and/or shrubs; percent cover of key species; and/or average height of dominant/key species. After each data collection effort, all collected and analyzed data will be evaluated to determine existing habitat type and avian utilization. After multiple data collection efforts, comparisons between each time period will be assessed to determine the evolution of the habitat and how avian species are reacting to the changes.

Objective #2: Support nesting activity for brown pelicans, terns, skimmers, and wading birds that contributes to making the environment and the public whole for spill-related injuries

Analysis: CWB Nesting Activity: Aerial photographs (Appendix A) will be analyzed using the same methods used to analyze photographs collected in the study area in 2010 to 2013 and 2018 (Ford 2010). Photographs from May and June surveys will be evaluated for their representation of peak breeding population size for each species at each colony. For most species, photographs from May surveys will represent peak breeding numbers and will be selected for analysis. For some species, especially black skimmer, photos from June surveys will better represent peak numbers and will be used for analysis. Occasionally, especially for brown pelican, royal tern (*Thalasseus maximus*), and sandwich tern (*Thalasseus sandvicensis*), well-developed colonies will be counted using May photographs, but additional large nesting groups that form after the May survey will be counted from June photographs and summed with May counts for a total number of nests.

All images of each individual colony will be inspected for clarity, location within the colony, and extent of colony coverage. Those best suited for nest counts based on those criteria and collectively comprising all areas photographed will be analyzed using counting software (Image-Pro, Media Cybernetics). Nests and birds will be marked manually, and the software will automatically tally total counts for each category. Although the primary objective will be to determine number of nests, individual birds and chicks of each species will be counted in each photograph.

For brown pelican, nests will be categorized by their stage of development. These categories will include the following:

- Well-built nest (with attending adult and with or without chicks)
- Poorly built nest (pre-egg laying)
- Nest with chicks but without attending adults
- Abandoned nest (with eggs but unattended)
- Empty nest (early-season unattended without eggs or chicks)
- Brood (dependent chicks away from an obvious nest and not attended by an adult)

Together, these categories will provide numbers of pelican nests and breeding pairs at each colony based usually on a single aerial photographic survey even though egg-laying dates may span a period of months. For other species, all nests and territories will be marked more generally as “sites.” The detailed nest categories that will be used for brown pelicans are inappropriate for other species because of their small size (terns and gulls), scrape-nesting habits (terns and skimmers), or partial concealment by vegetation (waders and gulls).

Using the software, unique symbol-color combinations will be assigned to different nest and bird categories for each species. Where overlapping images are used to analyze portions of a colony, one or more lines will be drawn on the selected image to delineate the area to be counted using that image. Areas outside any such lines will then be counted using different images. This process will continue until the colony is counted completely with available photographs.

Compiling Data

After analyzing an image with the software, a screen capture of the analyzed image will be saved as a jpeg file. The screen capture will show all data, including image number, all symbols that marked nests and birds, total counts for each category, colony name, area number, the initials of the photo analyst, the date the image was analyzed, and any other annotations the photo analyst added. All screen captures will be saved with standardized file names and archived in colony-specific folders. All data from each screen capture will be manually entered into a Microsoft Access database.

Assessing Colony Conditions

Each analyzed image will be evaluated to characterize conditions at each colony. Factors that will be considered will include the following:

- The stage of the breeding cycle (e.g., early-, mid-, or late-incubation; early chick-rearing) for each species.
- Habitat occupancy (numerical and geographic extent to which each species occupied the habitat).
- Reproductive performance (e.g., pattern of abandonment, if any, chick production).
- Information specific to a particular image will be entered into a notes field in the main data table in the Access database. Information concerning the colony as a whole will be entered in a separate data table in the same database.

Project-Level Decisions: Performance Criteria and Potential Corrective Actions

In this section, the LA TIG describes how updated knowledge gained from the evaluation of monitoring data will be used at the project-level to determine whether the Project is considered successful or whether corrective actions are needed. A project may not be achieving its intended objectives because of previously identified key uncertainties, unanticipated consequences, previously unknown conditions, or unanticipated environmental drivers. The decision to implement (or not implement) corrective actions is one type of decision within the larger adaptive management decision-making framework.

Learning through monitoring allows for corrective actions to be made to achieve desired outcomes. **Table 3** identifies performance criteria, monitoring parameters, and potential corrective actions that could be taken if the performance criteria are not met (as defined in NRDA regulations (15 CFR 990.55(b)(1)(vii)). This table should not be considered all encompassing; rather, it represents a listing of potential actions for each individual parameter to be considered if the Project is not performing as expected once implemented. Other corrective actions may be identified post-implementation and included in an operations and maintenance (O&M) plan. The decision of whether or not a corrective action should be implemented for the Project should consider the overall outcomes of the restoration project (i.e., looking at the combined evaluation of multiple performance criteria) in order to understand why project performance deviates from the predicted or anticipated outcome. Corrective action may not be taken in all cases based on such considerations. The knowledge gained from this process could also inform future restoration decisions such as the selection, design, and implementation of similar projects.

Table 3. List of Project Monitoring Parameters, Performance Criteria, and Potential Corrective Actions

Monitoring Parameter	Final Performance Criteria Used to Determine Project Success	Interim Performance Criteria	Potential Corrective Actions or Mid-Course Corrections*
Area of potential nesting habitat for brown pelicans and/or wading birds	At year 5 post-construction, at least 15 ± 2 acres of select habitat will consist of at least 50 percent ± 5 percent vegetative cover (of which no less than 10 percent of the total is black mangrove within Cell 1 only).	At year 2 post-construction, information gathered to inform Year 3 planting effort and invasive vegetation removal.	Perform supplemental planting(s) of preferred native vegetation; Eradicate unwanted vegetation. (Ref. O&M plan, Framework, and Key Uncertainty Reference Number 5)
Area of potential nesting habitat for terns and skimmers	At year 5 post-construction, 7 ± 2 acres of select habitat will have less than 10 percent emergent vegetation.	At year 2 post-construction, information gathered to inform invasive vegetation removal and limestone supplementation.	Eradicate unwanted vegetation; expose bare ground/rock through mechanical methods. (Ref. O&M plan, Framework, and Key Uncertainty Reference Number 5)
Nesting Activity	Year 10: Brown pelican: as high as 4,000 nests; gulls: as high as 2,000 nests; wading birds: as high as 600 nests; terns and skimmers: as high as 400 nests.	Year 1: Brown pelican: as high as 1,500 nests; gulls: as high as 500 nests; wading birds: 0 nests; terns and skimmers: as high as 750 nests. Year 3: Brown pelican: as high as 2,000 nests; gulls: as high as 1,000 nests; wading birds: as high as 50 nests; terns and skimmers: as high as 500 nests. Year 5: Brown pelican: as high as 3,500 nests; gulls: as high as 2,000 nests; wading birds: as high as 600 nests; terns and skimmers: as high as 500 nests.	No corrective action is envisioned at Year 1 as the habitat is evolving for optimal bird use. That stated, unforeseen situations can be addressed utilizing adaptive management. (Ref. O&M plan and Framework) Years 3, 5, and 10: Brown pelican and wading birds: Additional preferred native vegetation plantings; eradicate unwanted vegetation; construction of artificial nesting platforms. In addition, in Year 5, rock dike modification may be needed, i.e., lower elevation as it relates to the interior island elevation prior to Year 6 nesting season. Terns and skimmers: Eradicate unwanted vegetation; supplement limestone or expose bare ground through mechanical methods prior to the nesting season of the following year. Predator control will be implemented as needed utilizing established methods. (Ref. O&M plan, Framework, and Key Uncertainty Reference Numbers 3, 4, and 5)

*The table provides the triggers for helping determine whether adjustments to the project are needed based on the performance criteria; potential corrective actions for unknown or unanticipated conditions should they arise would need to be determined.

5. Monitoring Schedule

The project monitoring schedule (**Table 4**) is separated by monitoring activities. Pre-execution monitoring will occur before project execution, if applicable. Execution of monitoring will occur when the Project has been fully executed as planned, although this timeframe may vary for different parameters. Performance monitoring will occur in the years following initial project execution (Years 1-10).

Table 4. Monitoring Schedule

Monitoring Parameters	Monitoring Time Frame						
	Pre-Execution Monitoring	Execution Monitoring (initial)	Post-Execution Monitoring (ongoing)				
		As-built (Year 0)	Year 1	Year 2	Year 3	Year 5	Year 10
CWB Aerial Nest Surveys	X		X		X	X	X
Vegetation Surveys				X		X	X

6. Data Management

6.1 Data Deliverables

CWB Nest Aerial Surveys: LA TIG representatives will receive copies of all data generated (e.g., survey tracks, survey photographs that coincide with those tracks, GIS files, KMZ files, associated metadata) in association with the five scheduled sampling events (Pre-Execution, Year 1, Year 3, Year 5, and Year 10). Due to the bimodal nature of colonial waterbird nesting, each sampling event consists of two individual aerial surveys (Survey #1: mid-May and Survey #2: mid-June). Future surveys will be implemented following previous survey windows conducted in 2010 to 2013 and 2018 in Louisiana.

CWB Nest Dotting Analyses: LA TIG representatives will receive an individual data analysis summary report for each of the five scheduled CWB Nest Aerial Survey sampling events (Pre-Execution, Year 1, Year 3, Year 5, and Year 10). Reports will include all data collected and analyses performed as well as all associated metadata.

Vegetative Surveys: LA TIG representatives will receive an individual summary report for each of the three scheduled sampling events (Year 2, Year 5, and Year 10). Reports will include all data collected and analyses performed as well as all associated metadata.

6.2 Data Description

To the extent practicable, all environmental and biological data generated during monitoring activities will be documented using standardized field datasheets. If standardized datasheets are unavailable or not readily amendable to record project-specific data, then project-specific datasheets will be drafted prior to conducting any project monitoring activities. Original hard copy datasheets and notebooks and photographs will be retained by the implementing Trustee.

Relevant project data that are handwritten on hard copy datasheets or notebooks will be transcribed (entered) into standard digital format. All field datasheets and notebook entries will

be scanned to PDF files. Electronic data files should be named with the date on which the file was created and should include a ReadMe file that describes when the file was created and by whom and any explanatory notes on the file contents. If a data file is revised, a new copy should be made and the original preserved.

All data will have properly documented FGDC/ISO metadata, a data dictionary (defines codes and fields used in the dataset), and/or a Readme file as appropriate (e.g., how data were collected, quality assurance/quality control [QA/QC] procedures, and other information about data such as meaning, relationships to other data, origin, usage, and format—can reference different documents).

6.3 Data Review and Clearance

Data will be reviewed for QA/QC in accordance with the *Monitoring and Adaptive Management Procedures and Guidelines Manual Version 1.0*, and any errors in transcription will be corrected. Implementing Trustees will verify and validate data and information and will ensure that all data are entered or converted into agreed upon/commonly used digital format and labeled with metadata following FGDC/ISO standards to the extent practicable and in accordance with implementing Trustee agency requirements.

After all identified errors are addressed, data are considered to be cleared. The implementing Trustee will give the other LA TIG members time to review the data before making such information publicly available (as described below). Before submitting the monitoring data and information package, co-implementing Trustees shall confirm with one another that the package is approved for submission.

6.4 Data Storage and Accessibility

Once data have been cleared, they will be submitted to the Restoration Portal.

Trustees will provide DWH NRDA MAM data and information to the Restoration Portal as soon as possible and no more than 1 year from when data are collected.

6.5 Data Sharing

Data will be made publicly available in accordance with the Federal Open Data Policy through the DIVER Explorer Interface within 1 year of when the data collection occurred.

7. Reporting

Based on the project monitoring schedule (Section 4), associated reporting will be submitted in Years 3, 6, and 11.

8. Roles and Responsibilities

The LA TIG is responsible for addressing MAM objectives that pertain to their restoration activities and for communicating information to the Trustee Council or Cross-LA TIG MAM work group. LDWF is the implementing Trustee for the project. the U.S. Department of the Interior will be the lead federal agency for conducting the environmental evaluation review for implementation. CPRA is a project partner. The implementing Trustees' roles include:

- Coordinating with the project partner to ensure data collection and report composition are completed
- Ensuring the project partner performs O&M activities as required
- Providing project progress information to the LA TIG

9. Monitoring and Adaptive Management Budget

The overall budget for the project monitoring and adaptive management is \$1,632,000, and includes CWB aerial nest surveys, CWB nesting dotting efforts, vegetation surveys, vegetation species removal, invasive vegetation species removal, predator control, anthropogenic disturbance funds, artificial nesting structures, and oversight costs.

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11. MAM Plan Revision History

Old Version #	Revision Date	Changes Made	Reason for Change	New Version #

Appendix A: Bird Colony Aerial Photography Protocol (RG Ford)

Aerial photographic surveys will be used to census waterbird colonies along the Louisiana shoreline based on previous colony photographic surveys carried out in 2010 to 2013 and 2015 following the DWH oil spill. The list of colonies visited in 2015 will be used as the baseline. The list will be adjusted after each survey session, adding newly discovered colonies and removing any former colonies at small islands that are found to be under water. Colonies containing only cryptic beach nesting birds, such as least terns, are not included.

Colony photographic surveys will be carried out from a fixed wing aircraft configured so that two photographers can work simultaneously. Photographers will be familiar with both aerial survey protocols and colony counting methodology so that they can determine immediately whether or not photograph quality is adequate for purposes of counting. Digital SLR cameras equipped with 18-200 and 200-300 mm telephoto lenses will be used to acquire photographs. Aircraft waypoints and time will be recorded automatically at 5 second or shorter intervals. Photograph time (recorded as part of the JPG file) will be used to estimate the position of each photograph.

Crews will consist of a pilot, a navigator/data recorder, and two photographers. The navigator will coordinate the sequence of colony visits and optimal aerial approach to each colony with the pilot. One photographer will take 'context' photographs showing a relatively wide area view of the colony while the other photographer will concentrate on more detailed closeup shots that will be used for counting. If time allows, the context photographer also will zoom in to obtain additional closeup photographs. The navigator will record when the aircraft is approaching a colony, when it is leaving, and the range of frame numbers shot over that colony.

As the aircraft approaches a target colony, the crew will assess the spatial distribution of birds on the colony. Photographers, navigator, and pilot will confer to determine the best angle of approach and the ideal altitude for photographic census. Their decision will be based on the shape of the colony, the species present at the colony, the strength and direction of the wind, vegetation around the colony, and angle of the sun. While the approach altitude is variable, all photography will be carried out at an altitude between 600 and 900-feet above sea level, adjusted so that birds present on the colony do not leave their nests. Multiple approaches from different directions or altitudes may be made if photographers determine they are not obtaining photographs of adequate quality or if birds appear to be responding to the presence of the aircraft.

Photograph files (JPGs) will be downloaded daily to an external backup device. Flash memory cards from the cameras will be labeled and stored when they are full. After each day's survey, a subset of photographs will be checked to ensure that the photographic quality is such that the photographs are usable for counting. If better photographs are required for a particular colony and if survey logistics allow, a colony may be visited a second time during a survey session.

Appendix B: Bird Quantification (i.e., Dotting) Protocol (RG Ford)

Aerial photographs (Appendix A) will be analyzed using the same methods used to analyze photographs collected in the study area in 2010 to 2013 (Ford 2010). Photos from May and June surveys will be evaluated for their representation of peak breeding population size for each species at each colony. For most species, photographs from May surveys will represent peak breeding numbers and will be selected for analysis. For some species, especially black skimmer, photos from June surveys will better represent peak numbers and will be used for analysis. Occasionally, especially for brown pelican, royal tern, and sandwich tern, well-developed colonies will be counted using May photographs, but additional large nesting groups that form after the May survey will be counted from June photographs and summed with May counts for a total number of nests.

All images of each individual colony will be inspected for clarity, location within the colony, and extent of colony coverage. Those best suited for nest counts based on those criteria and collectively comprising all areas photographed will be analyzed using counting software (Image-Pro, Media Cybernetics). Nests and birds will be marked manually, and the software will automatically tally total counts for each category. Although the primary objective will be to determine the number of nests, individual birds and chicks of each species will be counted in each photograph.

For brown pelican, nests will be categorized by their stage of development. These categories will include the following:

- Well-built nest (with attending adult and with or without chicks)
- Poorly built nest (pre-egg laying)
- Nest with chicks but without attending adults
- Abandoned nest (with eggs but unattended)
- Empty nest (early-season unattended without eggs or chicks)
- Brood (dependent chicks away from an obvious nest and not attended by an adult)

Together, these categories will provide numbers of pelican nests and breeding pairs at each colony based usually on a single aerial photographic survey even though egg-laying dates may span a period of months. For other species, all nests and territories will be marked more generally as “sites.” The detailed nest categories that will be used for brown pelicans are inappropriate for other species because of their small size (terns and gulls), scrape-nesting habits (terns and skimmers), or partial concealment by vegetation (waders and gulls).

Using the software, unique symbol-color combinations will be assigned to different nest and bird categories for each species. Where overlapping images are used to analyze portions of a colony, one or more lines will be drawn on the selected image to delineate the area to be counted using that image. Areas outside any such lines will then be counted using different images. This process will continue until the colony is counted completely with available photographs.

Compiling Data

After analyzing an image with the software, a screen capture of the analyzed image will be saved as a jpeg file. The screen capture will show all data, including image number, all symbols that marked nests and birds, total counts for each category, colony name, area number, the initials of the photo analyst, the date the image was analyzed, and any other annotations the photo analyst added. All screen captures will be saved with standardized file names and archived in colony-specific folders. All data from each screen capture will be manually entered into a Microsoft® Access database.

Assessing Colony Conditions

Each analyzed image will be evaluated to characterize conditions at each colony. Factors that will be considered will include the following:

- The stage of the breeding cycle (e.g., early-, mid-, or late-incubation; early chick-rearing,) for each species.
- Habitat occupancy (numerical and geographic extent to which each species occupied the habitat).
- Reproductive performance (e.g., pattern of abandonment, if any, chick production).
- Information specific to a particular image will be entered into a notes field in the main data table in the Access database. Information concerning the colony as a whole will be entered in a separate data table in the same database.

Data Summary Report

For each sampling event, the contractor will complete a data summary report, which will identify/quantify (where applicable) the following endpoints:

- Species and number of individuals/species encountered/colony
- Number of nests by species/colony
- Nest status by species/colony
- Contractor observations that may provide the LA TIG with insight into current and future avian restoration projects and/or adaptive management strategies

The contractor will provide designated LA TIG representatives with an individual, georegistered digital mapping product (i.e., photo mosaic) that clearly identifies counting subregions for each colony evaluated during photographic counting analyses.

Appendix B2

Operation, Maintenance, and Rehabilitation Plan – Queen Bess Island Restoration Project

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Appendix B2 – Operation, Maintenance, and Rehabilitation Plan – Queen Bess Island Restoration Project

Preface

The operations, maintenance, and rehabilitation plan is mostly based on the construction permit application drawings, which were submitted in August 2018. The features in the permit application are expected to be modified/refined as the project continues through the engineering and design phase as well as through potential field modifications during the construction phase. The operations, maintenance, and rehabilitation plan is a living document and will be updated throughout the engineering and design phase and upon completion of the project's construction phase in order to incorporate all features and quantities that were actually constructed and used.

1. Project Description, Purpose, and Location

The Queen Bess Island Restoration project is located in Barataria Bay, east of Mendicant Island, and north of Grand Isle and Grand Terre Islands in Jefferson Parish, Louisiana. Like many areas of Louisiana's coast, Queen Bess Island has experienced significant erosion and subsidence over the last 100 years. The island was also significantly impacted by the 2010 Deepwater Horizon oil spill. The current 36-acre footprint of the island only provides approximately 5 acres of suitable habitat for nesting birds (Louisiana Trustee Implementation Group 2017). Queen Bess is one of the top five brown pelican (*Pelecanus occidentalis*) rookeries in the state and the only brown pelican rookery in the Barataria Bay. The island is home to nesting brown pelicans, egrets, heron, terns, and gulls (Project Fact Sheet 2014). Without restoration measures to raise the elevation of the island and provide suitable habitat for nesting birds, it is likely that the island will become insufficient to support the current bird colony levels.

This project will raise the elevation of the island with suitable material to enhance nesting and brood-rearing habitat for brown pelicans and other nesting waterbirds, reinforce the armoring around the island to protect the island from wave action and tidal scour, and enhance vegetation and natural materials conducive to the enhancement the rookery.

The Queen Bess Island Restoration Project consists of the following features:

- 4,904 linear feet of rock containment dike with tidal exchange point (island perimeter)
- 1,070 linear feet of rock breakwaters (up to 13 breakwaters)
- Thirty-three acres of island restoration
- Seven acres of limestone nesting habitat
- Bird ramps (21 locations)
- Habitat plantings

2. Construction Completion

The Queen Bess Island Restoration Project completion report is included in Attachment III of this plan. Within the project completion is a summary of information and significant events, including

project personnel, final as-built project features, construction cost and project estimates, construction oversight cost, construction activities and change orders, pipeline and utility crossing owner information, and other significant milestone dates and comments.

The project as-built construction drawings updated with all field changes and modifications that occurred during construction are included in Attachment IV.

3. Project Permits

Project permit applications were completed and submitted to appropriate agencies, and permits were received prior to construction. These permits and permit amendments are included in Attachment V. Provisions for the renewal of federal and state permits may be required.

4. Items Requiring Operation, Maintenance, and Rehabilitation

The following completed, structural components jointly accepted by _____ and _____ will require operation, maintenance, repair, and/or rehabilitation throughout the first 10 years of the 20-year life of the project.

Rock Containment/Tidal Exchange: 4,904 linear feet of rock containment dikes along the perimeter of the island. The containment dikes were constructed to an elevation ranging from +1.5 to 5.5 feet North American Vertical Datum of 1988 (NAVD 88), with a 5-foot-wide crest and 3:1 side slopes. The bottom of the containment dike and interior side slopes are lined with a geotextile material. It is estimated that approximately 1,961 linear feet (40 percent) of the rock containment dike and tidal exchange point(s) may need to be degraded in Year 5 to maintain the minimum allowable elevation difference between the crest elevation of the rock containment dike and interior island elevation.

Rock Breakwaters: Up to 13 breakwaters, totaling approximately 1,070 linear feet, located along the southwest side of the island. The breakwaters are located offshore approximately 75 feet from the rock containment dike and constructed to an elevation of +3.0 feet NAVD 88 with a 5-foot-wide crest and 3:1 side slopes above a geotextile fabric material. It is anticipated that the rock breakwaters will require a 1- to 2-foot maintenance lift at Year 5 with an estimated quantity of 2,500 tons of rock riprap. To the extent possible, riprap removed from the containment dikes will be used for the breakwaters' maintenance lift.

Bird Ramps: Up to 21 bird ramps constructed of pads of crushed limestone spaced around the perimeter of the island. The limestone at the bird ramp locations is placed above the rock containment dike along the crest and seaward slope. The ramps are 50 feet wide and extend below the water surface and are spaced approximately 250 feet apart. The crushed limestone extends downward into the voids between armor stone in the rock dike and is compacted to form a relatively smooth surface that allows for passage of nesting birds. It is anticipated that the ramps will require maintenance at years 3, 5, and 9 by the addition of more crushed limestone. (This section of the plan will be revised if a different material, such as articulated mats, is selected for construction of the bird ramps.)

Nesting Bird Pad: The nesting bird pad is approximately 7.0 acres and is located within the southwest lobe of the island. The nesting pad is constructed of #8 limestone and is approximately 6 inches thick placed on top of a geotextile fabric. It is anticipated that an additional 2 inches of limestone will be needed to refurbish the pad in Years 5 and 9. It is estimated that approximately 4,000 cubic yards of limestone will be required to complete the maintenance events in Years 5 and 9.

Ponding Relief: It is anticipated that ponds may develop within the marsh creation area over time and that some effort may be needed to relieve ponding. It is estimated that an event to relieve ponding will be needed in Year 5. Relief of ponding will require that small swales be constructed in the marsh and uplands platform.

Vegetative Plantings: Plantings of the higher elevations will be included in the construction event. Based on expected settlement of the intertidal areas and recovery of nourished marsh, plantings in the operations and maintenance (O&M) phase will be conducted in Year 1 to supplement the marsh vegetation and establish black mangrove (*Avicennia germinans*) habitats for nesting. Additionally, O&M plantings in Year 1 will supplement the plantings on the supratidal habitats planted during the construction contract. Lastly, black mangrove habitats in the intertidal areas and scrub/shrub in the supratidal areas are important for brown pelican nesting. Assessment of their establishment will be evaluated in Year 2. If insufficient establishment is noted, additional plantings may be conducted by Year 3. Below are planned planting events during the O&M phase:

Year 1 (2020)
Iva/Baccharis/Lycium – 14 acres (5 × 5 spacing)
Black mangrove – 5 acres (5 × 5 spacing)

Year 3 (2023)
Black mangrove – 5 acres (5 × 5 spacing)
Iva/Baccharis/Lycium – 7 acres (5 × 5 spacing)

Signage Replacement/Navigational Aid Maintenance: Ten permanent warning signs and navigational aids are located around the perimeter of Queen Bess Island. It is anticipated that warning signs will need replacement at Year 10 of the project life, and navigational aids will need to be inspected and maintained for 10 years.

5. Operation and Maintenance Budget

The cost associated with the operations, maintenance, and rehabilitation of the features outlined in Section 4 of this plan for the first 10 years of the 20-year life of the project is \$3,094,410.00.

6. Reference

Louisiana Trustee Implementation Group. 2017. *Final Restoration Plan #1: Restoration of Wetlands, Coastal, and Nearshore Habitats; Habitat Projects on Federally Managed Lands; and Birds*. Retrieved from:

http://www.gulfspillrestoration.noaa.gov/sites/default/files/FINAL%20LA%20TIG%20final%20ORP%20%231_508.pdf

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