Deepwater Horizon Natural Resource Damage Assessment

Mississippi Trustee Implementation Group Draft Restoration Plan 5 and Environmental Assessment: Nutrient Reduction and Birds

June 2026

MISSISSIPPI DEPARTMENT OF ENVIRONMENTAL QUALITY

U.S. DEPARTMENT OF THE INTERIOR · MARCH 3, 1849

NOAA · NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION · U.S. DEPARTMENT OF COMMERCE

UNITED STATES · ENVIRONMENTAL PROTECTION AGENCY

USDA

Cover photograph credits: Audubon Delta

NEPA Unique Identification Number 2026-0048064

Executive Summary

On April 20, 2010, the *Deepwater Horizon* (DWH) mobile drilling unit exploded, resulting in loss of life and a massive release of oil and natural gas from the BP Exploration and Production, Inc. (BP) Macondo well. Oil spread from the deep ocean to the surface and nearshore environment from Texas to Florida. Extensive response actions were undertaken to try to reduce harm to people and the environment. However, many of these response actions had collateral impacts on the environment and on natural resource services.

As part of a 2016 legal settlement, BP agreed to pay $8.1 billion in natural resource damages (inclusive of Early Restoration funding) over a 15-year period and up to an additional $700 million for adaptive management or to address injuries to natural resources that were unknown at the time of the settlement but may come to light in the future.[1] The settlement allocated a specific sum for restoration across Restoration Areas and Restoration Types.

The Mississippi Trustee Implementation group (MS TIG) is responsible for restoring natural resources and their services that were injured by the DWH oil spill within the Mississippi Restoration Area. The purpose of restoration, as discussed in this document and detailed in the 2016 *Deepwater Horizon Oil Spill: Final Programmatic Damage Assessment and Restoration Plan/Programmatic Environmental Impact Statement* (PDARP/PEIS; DWH NRDA Trustees 2016), is to make the environment and the public whole for injuries resulting from the DWH oil spill by implementing restoration actions that return injured natural resources and services to baseline conditions and compensate for interim losses, in accordance with the Oil Pollution Act of 1990 (OPA; 33 United States Code [U.S.C.] Section [§] 2701 *et seq.*) and associated Natural Resource Damage Assessment (NRDA) regulations (15 Code of Federal Regulations [CFR] part 990). The Final PDARP/PEIS and Record of Decision are available at https://www.gulfspillrestoration.noaa.gov/restoration-planning/gulf-plan.

The MS TIG, with the United States Department of the Interior (DOI) as the lead federal Trustee, prepared this *Draft Restoration Plan 5 and Environmental Assessment: Nutrient Reduction (Nonpoint Source) and Birds* (RP5/EA) to address injury to a subset of natural resources and natural resource services in the Mississippi Restoration Area resulting from the DWH oil spill. The project alternatives evaluated in this RP5/EA are consistent with the Restoration Type goals for Nutrient Reduction (Nonpoint Source) and Birds, as described in Sections 5.5.4 and 5.5.12 of the PDARP/PEIS. This RP5/EA includes a description and evaluation under OPA and the National Environmental Policy Act of 1969 (NEPA; 42 U.S.C. § 4321 *et seq.*, as amended), of five restoration projects, also called restoration alternatives, which would partially compensate for the natural resource injuries described in the Final

[1] Consent Decree, *United States v. BPXP et al.*, Civ. No. 10-4536, (E.D. La. Apr. 4, 2016), centralized in MDL 2179, In re Oil Spill by the Oil Rig "Deepwater Horizon" in the Gulf of Mexico, on April 20, 2010 (E.D. La.).

PDARP/PEIS. The OPA NRDA regulations provide that Trustees must consider a reasonable range of restoration alternatives before selecting their preferred alternative(s) (15 CFR § 990.53). The MS TIG reviewed 572 restoration project ideas, including 475 Wetlands, Coastal, and Nearshore Habitats projects, 418 Nutrient Reduction projects, 323 Sea Turtle projects, 213 Marine Mammal projects, 320 Birds projects, and 354 Oyster projects. The projects were proposed by individual members of the public, non-governmental organizations, and local, state, and federal agencies. Ultimately, the MS TIG identified five project alternatives for full evaluation in this document, as summarized in Table ES-1.

Table ES-1 lists the reasonable range of alternatives, noting those identified by the MS TIG as preferred for funding and implementation in this RP5/EA.

Table ES-1: The reasonable range of restoation alternatives proposed in RP5/EA, by Restoration Type

Proposed Restoration Alternatives	Preferred Non-Preferred	Estimated Project Cost
Restoration Type: Nutrient Reduction (Nonpoint Source)		
NR1. Nutrient Reduction and Hydrologic Restoration in Moss Point, MS	Preferred	$6,000,000
NR2. Big Cedar Creek-West Pascagoula River Nutrient Reduction	Non-Preferred	$2,500,000
Restoration Type: Birds		
Birds1. Lower Mississippi River Valley Migratory Bird Habitat Enhancement	Preferred	$5,500,000
Birds2. Restoration of Shorebird Habitat on Cat Island, MS	Preferred	$8,000,000
Birds3. Increased Nesting Success through Predator Management on Mainland Beaches	Non-Preferred	$500,000
Subtotal for Preferred Alternatives		**$19,500,000**

Table ES-2 provides a summary of the anticipated environmental consequences of the 5 projects (3 preferred; 2 non-preferred) and the no action alternative evaluated in this RP5/EA.

Table ES-2: A Comparison of Impacts for Alternatives Analyzed in the RP5/EA

Project	Geology and Substrates	Hydrology and Water Quality	Wetlands	Floodplains	Air Quality	Noise	Habitats and Wildlife (including Birds)	Marine and Estuarine Fauna and Federally Managed Fisheries	Protected Species	Economic Effects	Cultural Resources	Infrastructure	Aesthetics and Visual Resources	Land and Marine Management	Tourism and Recreational Use	Fisheries and Aquaculture	Marine Transportation	Public Health and Safety Including Shoreline Protection
Nutrient Reduction Restoration Type																		
No Action – Nutrient Reduction	NE	l	NE	NE	NE	NE	NE	l	NE	NE	NE	NE	NE	NE	NE	l	NE	NE
NR1, Nutrient Reduction and Hydrologic Restoration in Moss Point, MS (preferred)	l/+	+	s	+	s/+	s	s/+	+	NE	+	NE	+	+	NE	+	+	NE	+
NR2, Big Cedar Creek-West Pascagoula River Nutrient Reduction (non-preferred)	S/+	S/+	S	NE	s	s	S/+	+	NE	+	NE	NE	NE	NE	NE	+	NE	+
Birds Restoration Type																		
No Action – Birds	NE	NE	NE	NE	NE	NE	l	NE	L	NE	NE	NE	NE	NE	NE	NE	NE	NE
Birds1, Lower Mississippi River Valley Migratory Bird Habitat Enhancement (preferred)	l	l/+	s/+	NE	s	s	s/+	NE	NE	+	NE	NE	s/+	NE	s/+	NE	NE	NE
Birds2, Restoration of Shorebird Habitat on Cat Island, MS (preferred)	l/+	s	s	NE	s	s	S/+	l	S/+	+	NE	NE	s/+	NE	s/+	s	NE	NE
Birds3, Increased Nesting Success through Predator Management on Mainland Beaches (non-preferred)	s	NE	NE	NE	NE	s	l/+	NE	+	NE	NE	NE	s	NE	s/+	NE	NE	NE

+	Beneficial effect	**S**	Short-term, major adverse effect
NE	No effect	l	Long-term, minor adverse effect
s	Short-term, minor adverse effect	L	Long-term, moderate adverse effect
S	Short-term, moderate adverse effect	**L**	Long-term, major adverse effect

Public Participation in this RP5/EA

The MS TIG prepared this RP5/EA to (1) inform the public about DWH NRDA restoration planning efforts in the Mississippi Restoration Area, (2) present analyses on the potential restoration benefits and environmental consequences of the reasonable range of restoration alternatives, and (3) seek public comment on this RP5/EA.

The public is encouraged to review and comment on this RP5/EA during the 30-day comment period following publication of the public notice of its availability. The deadline for submitting written comments is specified in the public notice published in the *Federal Register* and on the MDEQ Office of Restoration and the DWH Trustee Council websites. Comment period information and other details can also be found on the Trustees' website.[2]

To facilitate public review, the MS TIG will post a pre-recorded public webinar to present an overview of the Draft RP5/EA. A webinar publication date is provided in the *Federal Register* notice, on the MDEQ Office of Restoration website and on the DWH Trustee Council website. During the comment period, comments can be submitted by any of the following methods:

- **Online.** https://parkplanning.nps.gov/projectHome.cfm?projectId=132286https://parkplanning.nps.gov/MSRP5EA
- **By mail.** Hard copy addressed to U.S. Fish and Wildlife Service Gulf Restoration Office, 341 North Greeno RD, Suite A, Fairhope, Alabama, 36532. To be considered, mailed comments must be postmarked on or before the comment deadline.

Please note that personal identifying information included in the submitted comments (such as name, address, phone number, and email address) may be made publicly available at any time. Personal information is not required to submit comments.

[2] The Trustees' website can be found at www.gulfspillrestoration.noaa.gov.

Table of Contents

Appendices

List of Tables

List of Figures

List of Abbreviations/Acronyms

A

ATV	All-terrain vehicle

B

BMP	Best management practice
BP	BP Exploration and Production, Inc.

C

C.F.	Cubic Feet
CFR	Code of Federal Regulations
CZMA	Coastal Zone Management Act

D

DIVER	Data Integration Visualization Exploration and Reporting
DOI	United States Department of the Interior
DWH	*Deepwater Horizon*

E

EA	Environmental Assessment
E&D	Engineering and Design
EFH	Essential Fish Habitat
EO	Executive Order
ESA	Endangered Species Act of 1973
E1UBL	Estuarine Subtidal Unconsolidated Bottom
E2EM1P	Estuarine Intertidal Emergent Persistent, irregularly flooded
E2USM	Estuarine Intertidal Unconsolidated Shore, regularly flooded

E2USP	Estuarine Intertidal Unconsolidated Shore, irregularly flooded

F

FMP	Fishery Management Plan

G

Gulf	Gulf of America

H

HCD	Habitat Conservation Division
HEC-RAS	Hydrologic Engineering Center's River Analysis System
HUC	Hydrologic Unit Code

I

IPaC	Information for Planning and Consultation

M

MAM	Monitoring and Adaptive Management
MAM Manual	Monitoring and Adaptive Management Procedures and Guidelines
MBTA	Migratory Bird Treaty Act
MDAH	Mississippi Department of Archives and History
MDEQ	Mississippi Department of Environmental Quality
MDMR	Mississippi Department of Marine Resources
MDWFP	Mississippi Department of Wildlife, Fisheries, and Parks
MMPA	Marine Mammal Protection Act
MS	Mississippi
MS TIG	Mississippi Trustee Implementation Group
M2US2P	Marine Intertidal Unconsolidated Shore, irregularly flooded

N

NAAQS	National Ambient Air Quality Standards
NbS	Nature-based solutions
NEPA	National Environmental Policy Act of 1969
NFWF-GEBF Fund	National Fish and Wildlife Foundation Gulf Environmental Benefit
NHPA	National Historic Preservation Act
NLEB	Northern Long-Eared Bat
NMFS	National Marine Fisheries Service
NOAA	National Oceanic and Atmospheric Administration
NR	Nutrient Reduction
NRCS	Natural Resources Conservation Service
NRDA	Natural Resource Damage Assessment
NWI	National Wetlands Inventory
NWR	National Wildlife Refuge

O

OPA	Oil Pollution Act of 1990

P

PCE	Primary Constituent Elements
PDARP/PEIS	2016 *Deepwater Horizon* Oil Spill: Final Programmatic Damage Assessment and Restoration Plan/Programmatic Environmental Impact Statement

R

RESTORE Act	Resources and Ecosystems Sustainability, Tourist Opportunities, and Revived Economies of the Gulf Coast States Act
ROD	Record of Decision
RP	Restoration Plan

S

SAV	Submerged Aquatic Vegetation
SOPs	Standard Operating Procedures

T

TC	Trustee Council
TIG	Trustee Implementation Group

U

USACE	United States Army Corps of Engineers
U.S.C.	United States Code
USDA	United States Department of Agriculture
USEPA	United States Environmental Protection Agency
USFWS	United States Fish and Wildlife Service

W

WMA	Wildlife Management Area
WMU	Wildlife Management Unit

1.0 Introduction, Purpose and Need, and Public Participation

This *Draft Restoration Plan 5 and Environmental Assessment: Nutrient Reduction and Birds* (RP5/EA) was prepared by the Mississippi Trustee Implementation Group (MS TIG). The MS TIG includes Trustees from the Mississippi Department of Environmental Quality (MDEQ) and four federal agencies: the National Oceanic and Atmospheric Administration (NOAA); the United States Department of the Interior (DOI); the United States Department of Agriculture (USDA); and the United States Environmental Protection Agency (USEPA). The MS TIG is responsible for restoring natural resources and services in the Mississippi Restoration Area that were injured or lost as a result of the *Deepwater Horizon* (DWH) oil spill.

The MS TIG prepared this RP5/EA to continue restoration of natural resources and the services they provide that were injured or lost as a result of the DWH oil spill, to inform the public about the DWH Natural Resource Damage Assessment (NRDA) restoration planning efforts, and to seek public comment on the identified reasonable range of alternatives for restoration of injured resources. This RP5/EA was prepared in accordance with the *Deepwater Horizon Oil Spill: Final Programmatic Damage Assessment and Restoration Plan/Programmatic Environmental Impact Statement* (PDARP/PEIS; DWH Trustees, 2016) and the Record of Decision (ROD),[3] DWH Trustee Council (TC)'s standard operating procedures (SOPs; DWH Trustees, 2021), the Oil Pollution Act of 1990 (OPA; 33 United States Code [U.S.C.] Section [§] 2701 *et seq.*) and associated Natural Resource Damage Assessment (NRDA) regulations, and the National Environmental Policy Act of 1969 (NEPA, 42 U.S.C. § 4321 *et seq.*, as amended). In this RP5/EA, the MS TIG evaluates a reasonable range of alternatives to reduce nutrient pollution (nonpoint source) and restore injuries to birds in the Mississippi Restoration Area. In this RP5/EA, the MS TIG identifies its preferred alternatives, which it believes would best compensate the public, in part, for the injuries caused by the DWH oil spill in the Mississippi Restoration Area.

1.1 Background and Summary of Settlement

On April 20, 2010, the DWH mobile drilling unit exploded, caught fire, and eventually sank in the Gulf of America (formerly the Gulf of Mexico, herein referred to as "the Gulf"),[4] resulting in a massive release of oil from BP Exploration and Production, Inc.'s (BP's) Macondo well that caused pervasive natural resource injuries across the northern Gulf. Extensive response actions, including cleanup activities and actions to try to prevent the oil from reaching sensitive resources, were undertaken to try to reduce harm to people and

[3] The PDARP/PEIS, ROD, and Consent Decree can be found on the DWH Trustee website: www.gulfspillrestoration.noaa.gov/.

[4] The waterbody was renamed per Executive Order 14172 "Restoring Names That Honor American Greatness" (January 20, 2025).

the environment. However, many of these response actions had collateral impacts on the environment and natural resource services. The breadth of injuries incurred from the incident are described in Chapter 4 of the PDARP/PEIS.

Under the authority of OPA, a council of federal and state trustees (DWH Trustees[5]) was established to assess natural resource injuries resulting from the incident and to work to make the environment and public whole for those injuries. In accordance with OPA and the OPA NRDA regulations (15 Code of Federal Regulations [CFR] part 990), the DWH Trustees issued a PDARP/PEIS and subsequent ROD in February 2016 detailing a plan to fund and implement restoration projects across the Gulf with available restoration funds. The PDARP/PEIS sets forth the process for DWH restoration planning to select specific projects for implementation including outlining programmatic Restoration Goals and Restoration Types (see Figure 5.4-1 of the PDARP/PEIS). The PDARP/PEIS also established a distributed governance structure that assigned a TIG for each of the eight Restoration Areas.[6] The MS TIG makes all restoration decisions for use of the funds allocated to the Mississippi Restoration Area. Chapter 7 of the PDARP/PEIS provides detailed information on the Trustees and the TIG governance structure. In April 2016, the U.S. District Court for the Eastern District of Louisiana entered a Consent Decree resolving civil claims by the Trustees against BP arising from the DWH oil spill.

1.2 Restoration Planning by the TIG

Restoration planning from the DWH oil spill began in Mississippi on April 20, 2011, as part of the Early Restoration Framework Agreement wherein BP agreed to provide up to $1 billion toward Early Restoration projects in the Gulf.[7] Long-term restoration planning is addressed as part of the DWH Consent Decree and the Final PDARP/PEIS, which allocate funding totaling $8.1 billion for certain restoration types, as well as for monitoring, adaptive management, and administrative oversight. These funding allocations include approximately $265 million to Mississippi through the MS TIG. The MS TIG is implementing or has completed implementation of five post-settlement restoration plans: one in 2017, a Supplemental Restoration Plan in 2019, one in 2020, one in 2022, and one in 2024.

On May 8, 2024, the MS TIG invited the public to submit project ideas for restoration in the Mississippi Restoration Area related to the Wetlands, Coastal, and Nearshore Habitats;

[5] The Trustees are the entities authorized under OPA to act on behalf of the public to assess the natural resource injuries resulting from the DWH oil spill and to develop and implement project-specific restoration plans to compensate for those injuries. The DWH Trustee Council is made up of four federal Trustee agencies (the U.S. Department of the Interior (DOI), U.S. Environmental Protection Agency (EPA), National Oceanic and Atmospheric Administration (NOAA), and the U.S. Department of Agriculture (USDA)) and Trustees from all five Gulf states (Alabama, Florida, Louisiana, Mississippi, and Texas).

[6] The restoration areas are Alabama, Florida, Louisiana, Mississippi, Texas, Regionwide, Open Ocean, and Unknown Conditions & Adaptive Management.

[7] The Early Restoration Framework Agreement can be found at www.fws.gov/doiddata/dwh-ar-documents/994/DWH-AR0233493.pdf.

Nutrient Reduction; Oysters; Sea Turtles; Marine Mammals; and Birds Restoration Types. The MS TIG subsequently screened 572 project idea submissions. On June 2, 2025, following the completion of screening, the TIG posted a public notice on the DWH Trustees' website indicating that the MS TIG was initiating this RP5/EA focusing on two restoration types: Nutrient Reduction (Nonpoint Source) and Birds (see additional detail in Section 1.6).

Table 1-1 shows the total MS TIG settlement funds, funds allocated to date for planning and projects, and funds proposed for this RP5/EA. For the most up-to-date project information, see NOAA's Gulf Spill Restoration website.

Table 1-1: MS TIG Funds by Restoration Goal and Restoration Type

PDARP/PEIS Programmatic Restoration Goal	Restoration Type	Total MS TIG Settlement Funds	Funds Allocated[8]	Funds Proposed in this RP5/EA	Funds Remaining
Restore and Conserve Habitat	Wetlands, Coastal, and Nearshore Habitat	$135,500,000	$125,637,500		$9,862,500
	Habitat Projects on Federally Managed Lands	$5,000,000	$3,000,000		$2,000,000
Replenish and Protect Living Coastal and Marine Resources	Sea Turtles	$5,000,000	$2,500,000		$2,500,000
	Marine Mammals	$10,000,000	$5,440,000		$4,560,000
	Birds	$25,000,000	$11,355,500	$13,500,000	$144,500
	Oysters	$33,600,000	$24,100,000		$9,500,000
Restore Water Quality	Nutrient Reduction	$27,500,000	$9,695,000	$6,000,000	$11,805,000
Provide & Enhance Recreational Opportunities	Provide & Enhance Recreational Opportunities	23,957,000	$23,796,000		$161,000
Monitoring & Adaptive Management	N/A	$7,500,000			7,500,000
	Total:	**$273,057,000**	**$205,524,000**	**$19,500,000**	**$48,033,000**

[8] This includes funds allocated to restoration planning (e.g., plan development), Early Restoration projects, Mississippi TIG RP1/EA, RP2/EA, RP3/EA, and RP4/EA projects, the Development of a Diatom and Bacteria Community Assessment Tool for Coastal Mississippi Project, and activities that inform restoration planning (e.g., address data gaps), and monitoring and adaptive management activities, as reported through the NOAA DIVER website. Data is current as of April 2026.

1.3 Oil Pollution Act and National Environmental Policy Act Compliance

As an oil pollution incident, the DWH oil spill is subject to the provisions of OPA (33 U.S.C. § 2701 *et seq*.). A primary goal of OPA is to make the environment and public whole for injuries to natural resources and services resulting from an incident involving an oil discharge or substantial threat of an oil discharge. OPA and its implementing regulations (15 CFR part 990) identify standards that the MS TIG must consider in evaluating restoration projects. Under 15 CFR §§ 990.54-55, the MS TIG must consider a reasonable number of restoration alternatives when selecting a restoration project for implementation.

In addition, the federal trustees must comply with NEPA (42 U.S.C. § 4321 *et seq.)* and agency-specific NEPA implementing procedures and regulations when proposing restoration projects. The NEPA analysis in this integrated OPA/NEPA document is being prepared in accordance with NEPA and its amendments. The Final PDARP/PEIS was intended to be used to tier the NEPA analysis in subsequent restoration plans prepared by the TIGs, consistent with 42 U.S.C. § 4336b (see Chapter 6 of the Final PDARP/PEIS). A tiered environmental analysis focuses on project-specific issues and summarizes or references the broader issues discussed in a programmatic NEPA analysis—in this case, the Final PDARP/PEIS. The NEPA analysis in this RP5/EA tiers from the Final PDARP/PEIS, where applicable. Additionally, the MS TIG incorporates by reference existing NEPA analyses, management plans, studies, or other relevant material. In this RP5/EA, the MS TIG adopts existing NEPA analyses where applicable in the analysis of impacts in Chapter 4.

NEPA requires that when a federal agency relies on a programmatic environmental document more than five years old, the federal agency must reevaluate the analysis and any underlying assumptions in the programmatic environmental document to ensure the analysis remains valid. The DWH Federal Trustees reviewed the framework of the PDARP/PEIS for continued relevance, and in a memorandum dated June 28, 2024, affirmed the continued validity of the PDARP/PEIS to the overall program. The Federal Trustees will evaluate whether new information or changed circumstances may affect the continued validity of the PDARP/PEIS at the project level during the preparation of each tiered RP/EA. The MS TIG determined that the analysis in the PDARP/PEIS and the underlying assumptions therein in the context of the projects proposed in this RP5/EA remain valid and that it continues to be applicable as a programmatic evaluation for DWH restoration planning.

DOI is the lead federal Trustee for preparing this RP5/EA pursuant to NEPA (42 U.S.C. § 4336a(a)(1)(A)). The other MS TIG federal and state Trustees are acting as cooperating agencies for the purposes of NEPA compliance in the development of this RP5/EA (42 U.S.C. § 4336a(a)(3)). Each federal cooperating agency on the MS TIG will review the analysis for adequacy in meeting the standards set forth in its own NEPA implementing procedures and subsequently adopt the NEPA analysis if appropriate (42 U.S.C. § 4336a(b)). Adoption of the EA would be completed via signature on the relevant NEPA decision document.

1.4 Purpose and Need

The MS TIG has undertaken this restoration planning effort to meet the purpose of contributing to the compensation for and restoration of natural resources and their services injured in the Mississippi Restoration Area resulting from the DWH oil spill. This RP5/EA is consistent with and tiers from the PDARP/PEIS, which identified extensive and complex injuries to natural resources and their services across the Gulf as well as a need to and a plan for comprehensive restoration consistent with OPA. This RP5/EA falls within the scope of the purpose and need identified in the PDARP/PEIS. As described in Section 5.3 of the PDARP/PEIS, the programmatic Restoration Goals work independently and together to benefit injured resources and services. The reasonable range of restoration alternatives in this RP5/EA addresses two programmatic Restoration Goals: Restore Water Quality and Replenish and Protect Living Coastal and Marine Resources, focusing on the Nutrient Reduction and Birds Restoration Types. For Nutrient Reduction, the TIG proposes the following approaches: reducing nutrient loads to coastal watersheds and reducing pollution and hydrologic degradation to coastal watersheds. For Birds, the TIG proposes these approaches: restoring and conserving bird nesting and foraging habitat; restoring and enhancing dunes and beaches; creating, restoring, and enhancing barrier and coastal islands and headlands; and preventing incidental bird mortality.

Additional information about the purpose and need for DWH NRDA restoration can be found in Section 5.3.2 of the PDARP/PEIS.

1.5 Proposed Action and Alternatives: Draft MS TIG RP5/EA

1.5.1 Proposed Action

The MS TIG proposes three preferred alternatives[9] for implementation to meet the purpose and need of providing restoration towards meeting two of the programmatic Restoration Goals identified in the PDARP/PEIS: Restore Water Quality and Restore and Protect Living Coastal and Marine Resources.

1.5.2 Proposed Alternatives

In addition to the proposed action, the MS TIG is evaluating two non-preferred alternatives as part of the reasonable range of alternatives analysis, as well as a no action alternative (evaluated as a baseline for NEPA analysis). Further detail on the screening process can be found in Section 2.2.

The total estimated cost to implement the preferred restoration alternatives in this RP5/EA would be approximately $19.5 million: $6 million from the MS TIG's Nutrient Reduction allocation and $13.5 million from the MS TIG's Birds allocation. Detailed information on all alternatives can be found in Section 2.5 of this document.

[9] For the purposes of this RP5/EA, each project evaluated in the reasonable range is considered a separate alternative; therefore, the terms "project" and "alternative" are used interchangeably.

Table 1-2 is a summary of the reasonable range of alternatives for RP5. Project locations for the reasonable range of alternatives are depicted in Figure 1.1.

Table 1-2: RP5/EA Reasonable Range of Alternatives

Alternative	Preferred	Estimated Project Costs
Nutrient Reduction (Nonpoint Source) Restoration Type		
NR1, Nutrient Reduction and Hydrologic Restoration in Moss Point, MS This project would include co-located hydrologic and stormwater system enhancements to directly address nutrient loading in Moss Point, MS. This would be accomplished through the construction of a nature-based stormwater park and urban reforestation and would include the following co-located hydrologic and stormwater system enhancements. **First Street Stormwater Park**: The proposed stormwater park would be designed to capture and filter runoff that currently overwhelms existing stormwater infrastructure. Nutrient sources include new construction, local fertilizer use, organic materials, pet waste, roadways, and other impervious surfaces. During storm events, storm sewers downstream of the stormwater park overflow, occasionally causing sewer clean-out pipes in residential yards to overflow in the Rose Drive area. Stormwater retention and treatment in the First Street Stormwater Park would serve to reduce storm sewer overflows in the area. **Khayat Park Reforestation:** The project would fund the reforestation of Khayat Park, which is located in the vicinity of the proposed stormwater park. This area is currently open space and located adjacent to a large conveyance ditch that drains into Bayou Casotte, a coastal waterway that flows to the Mississippi Sound. This project would increase urban forest in the city landscape to increase rainfall interception, enhance stormwater infiltration into soil, restore a more natural hydroperiod for water runoff entering coastal waterbodies, and reduce water quality impacts from polluted stormwater. The reforestation effort would utilize native plant species known to be effective at reducing stormwater flows.	Preferred	$6,000,000
NR2, Big Cedar Creek - West Pascagoula River Nutrient Reduction This watershed-scale project would improve water quality impacted by the DWH oil spill by implementing conservation practices that reduce nutrient loads and the sediments carrying	Non-Preferred	$2,500,000

Alternative	Preferred	Estimated Project Costs
them into coastal waters in the Big Cedar Creek – West Pascagoula River watershed. The health of the Gulf depends upon the health of its estuaries, and land uses influence the health of those coastal waters in the watersheds of its tributaries. The USDA would provide outreach and technical assistance to voluntary participants (private landowners and local units of government), especially on the most vulnerable acres in the watersheds, to develop conservation plans and implement nutrient reduction-related conservation practices. The project proposes to implement clusters of projects within the smallest watershed practicable with the goal of making a discernible difference in water quality at the watershed level.		
Birds Restoration Type		
Birds1, Lower Mississippi River Valley Migratory Bird Habitat Enhancement The project would build upon a 2020 MDEQ project funded through National Fish and Wildlife Foundation (NFWF) Gulf Environmental Benefit Fund (GEBF). The NFWF-GEBF project enhanced and actively managed wetland management units (WMUs) in multiple National Wildlife Refuges (NWRs) and Wildlife Management Areas (WMAs) in the Lower Mississippi River Valley (LMRV). In order to continue those project goals, restoration activities are proposed at new WMUs in some of the NWRs and WMAs addressed by the GEBF project, and also in WMUS in other NWRs and WMAs, in order to restore/improve habitat conditions to benefit multiple species of migratory birds affected by the 2010 DWH oil spill. The primary objective is to ensure that adequate shallow-water habitat is maximized within the project areas to meet or exceed the foraging requirements of shorebirds, wading birds, and waterfowl during their migration to and from the Gulf. By increasing available shallow-water habitat, which increases food resources, populations of these species are expected to benefit through greater overwinter survival and increased breeding success the following year.	Preferred	$5,500,000
Birds2, Restoration of Shorebird Habitat on Cat Island, MS The objective of the project is to restore beach and dune habitat for shorebirds on Cat Island through the dredging and placement of sand resources along the northeastern tip of Cat Island that is similar to existing shoreline habitats. Creation of beach/dune habitat would provide significant nesting and foraging opportunities for Mississippi's shorebird population,	Preferred	$8,000,000

Alternative	Preferred	Estimated Project Costs
provide increased structural integrity for the island and existing habitats, and directly complement similar efforts on the southeastern section of Cat Island funded through the RESTORE Act. The project would restore the historical footprint of the northeastern portion of the island to its early 1900s footprint, totaling approximately 100 acres.		
Birds3, Increased Nesting Success through Predator Management on Mainland Beaches An increase in predators on mainland beaches in coastal Mississippi has been observed in recent years. This project would create and implement a predator management strategy to identify the methods that provide the optimal mix of effectiveness and cost efficiency for each predator species, in order to reduce their impact on injured species like the Least Tern (*Sternula antillarum*). More aggressive or costly actions such as lethal control, capture and translocation, or installation of mammal exclusion fences would be considered for predator species that regularly lead to complete colony failure, such as raccoons (*Procyon lotor*), foxes (V*ulpes vulpes* and *Urocyon cinereoargenteus*), coyotes (*Canis latrans frustror*), and Great Horned Owl (*Bubo viginianus*). Deterrent actions or habitat management actions that reduce predator use of the surrounding landscape would be used when aggressive methods are not feasible or desirable, and for species that regularly prey on eggs or chicks but are rarely responsible for complete colony failure (e.g., Fish Crows, gulls, Gull-billed Terns). Data collected during follow-up monitoring would be used to inform a long-term predator management plan for the benefit of mainland Least Terns. There would also be opportunities to promote environmental stewardship, education, and outreach.	Non-Preferred	$500,000

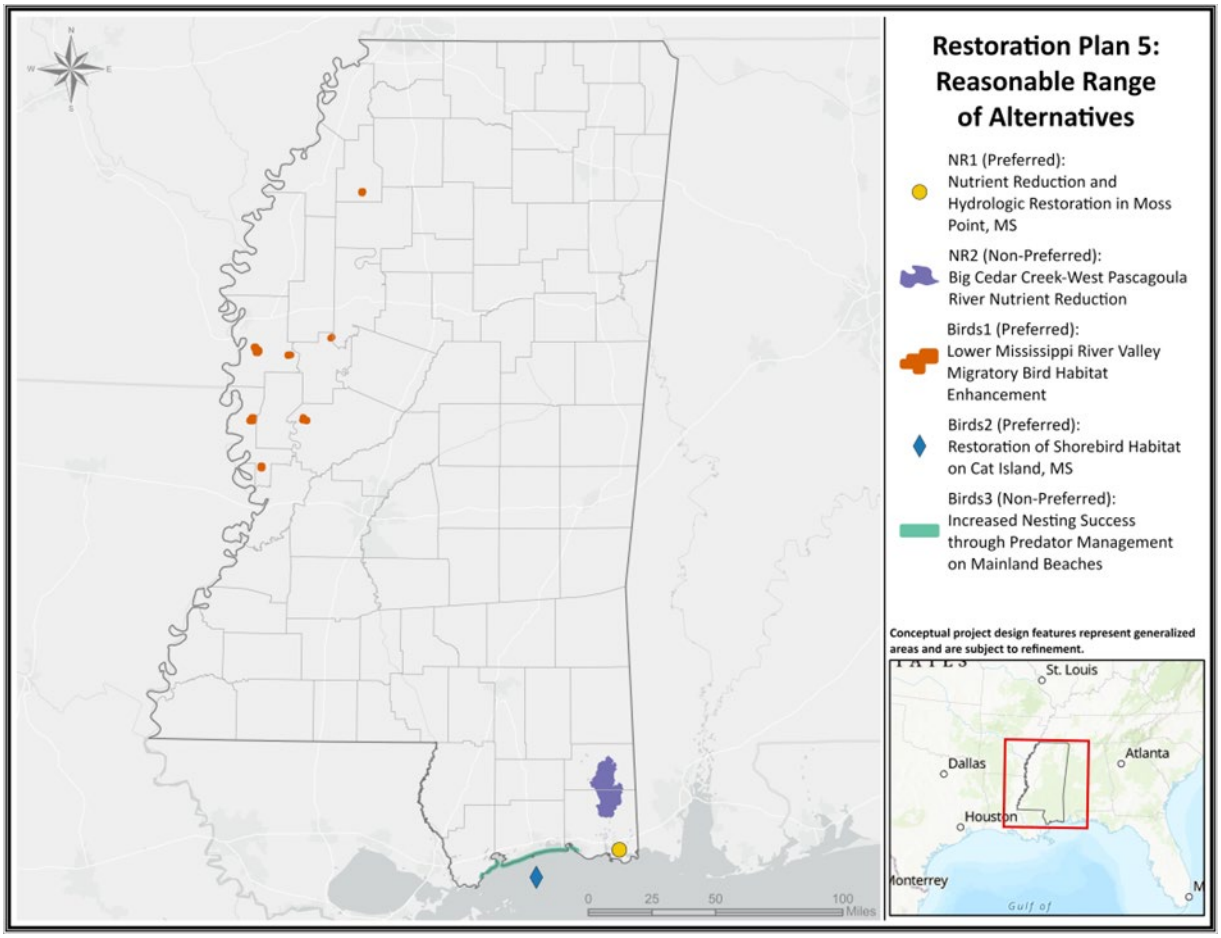

Figure 1-1: RP5/EA Reasonable Range of Alternatives

1.5.3 Natural Recovery/No Action Alternative

Under the natural recovery/no action alternative, the MS TIG would not select or implement any of the restoration alternatives proposed in this RP5/EA. The Trustees analyzed the natural recovery alternative programmatically in the PDARP/PEIS and found that it would not meet the purpose and need for restoring lost natural resources and their services. That analysis is incorporated herein, and the MS TIG does not further evaluate natural recovery as a viable alternative under the OPA NRDA regulations. However, a no action alternative is included in this RP5/EA pursuant to NEPA for each Restoration Type in order to analyze the potential adverse impacts of not implementing the action.

1.6 Public Involvement

On May 8, 2024, the MS TIG published a notice on the DWH Trustee Council website calling for project restoration ideas in Mississippi related to the Wetlands, Coastal, and Nearshore Habitats; Nutrient Reduction; Oysters; Sea Turtles; Marine Mammals; and Birds Restoration

Types[10] (Notice). The Notice encouraged the public to submit new ideas or make revisions to previously submitted project ideas by June 7, 2024.

In developing this RP5/EA, the MS TIG screened 572 project ideas, including those previously submitted to the MDEQ Restoration Project Idea portal[11] and the Trustee Council Project Submission Portal[12] as well as those proposed by June 7, 2024 in response to the May 8, 2024 Notice.

On June 2, 2025, following the completion of screening, the MS TIG posted a public notice on the DWH Trustees' website indicating that the MS TIG was initiating restoration planning for this RP5/EA, for two restoration types: Nutrient Reduction (Nonpoint Source) and Birds.[13]

The public is encouraged to review and comment on this RP5/EA during the 30-day comment period following publication of the Notice of Availability in the *Federal Register,* by the MDEQ Office of Restoration and the DWH Trustee Council. Comments can be submitted during the comment period by any of the following methods.

Via the Web. https://parkplanning.nps.gov/MSRP5EA

Via U.S. Mail. Hard copy addressed to U.S. Fish and Wildlife Service Gulf Restoration Office, 341 North Greeno RD, Suite A, Fairhope, Alabama, 36532.

Via the Prerecorded Public Webinar. The MS TIG will post a pre-recorded public webinar to present an overview of the Draft RP5/EA. A webinar publication date is provided in the *Federal Register*, on the restore.ms website, and on the DWH Trustee Council website. Personal identifying information included in the submitted comments (such as name, address, phone number, and email address) may be made publicly available at any time. Personal information is not required to submit comments.

Hard copy submissions must be postmarked no later than 30 days after the publication of the Notice of Availability for the Draft RP5/EA in the *Federal Register*.

After the close of the public comment period, the MS TIG will consider all comments received and revise the Draft RP5/EA, as needed. A summary of comments received and the MS TIG's responses will be included in the Final RP5/EA.

[11] https://www.mdeq.ms.gov/restoration/project-ideas/

[12] http://www.gulfspillrestoration.noaa.gov/restoration/give-us-your-ideas/suggest-a-restoration-project/

[13] https://www.gulfspillrestoration.noaa.gov/2025/06/notice-initiation-restoration-plan-drafting-mississippi

1.7 Decisions to be Made

This RP5/EA is intended to inform decision-makers and provide the public with information and analysis needed to enable meaningful review and comment on the alternatives presented in this document. Ultimately, the RP5/EA and the corresponding opportunity for the public to review and comment on this document are intended to guide the MS TIG's selection and implementation of one or more of the alternatives analyzed herein.

All alternatives identified in this RP5/EA are independent of each other. Alternatives identified as non-preferred in this proposed action may be considered independently for implementation in this and/or future restoration plans by the MS TIG or may be considered by other TIGs (e.g., Regionwide, Open Ocean).

1.8 Administrative Record

Pursuant to 15 CFR § 990.45, the DWH Trustees opened a publicly available Administrative Record for the DWH oil spill[14] including restoration planning activities, concurrently with publication of the 2010 Notice of Intent to Conduct Restoration Planning (75 Fed. Reg. 60800). DOI is the lead federal Trustee for maintaining the Administrative Record. Information about restoration project implementation is provided to the public through the Administrative Record and other outreach efforts (Section 1.6), including the DWH Trustees' website.[15]

1.9 Coordination with Other Gulf Restoration Programs

As discussed in Section 1.5.6 of the PDARP/PEIS, coordination with other Gulf restoration programs promotes successful implementation of restoration projects and optimizes ecosystem recovery. The MS TIG is committed to coordinating with other DWH oil spill and Gulf restoration programs (e.g., the Resources and Ecosystems Sustainability, Tourist Opportunities, and Revived Economies of the Gulf Coast States [RESTORE] Act, the National Fish and Wildlife Foundation's Gulf Environmental Benefit Fund [NFWF-GEBF]) to avoid potential redundancies in project selection. NRDA, RESTORE, and NFWF-GEBF projects currently funded within Mississippi are described on the Mississippi Restoration, NFWF-GEBF, and RESTORE websites.

Examples of this coordination include the proposed Lower Mississippi River Valley Migratory Bird Habitat Enhancement project, which would build upon a 2020 NFWF-GEBF project, through the MDEQ, which enhanced and actively managed WMUs in multiple NWR sand WMAs in the LMRV. Similarly, the proposed Restoration of Shorebird Habitat on Cat Island, MS project would restore approximately 100 acres within the historical footprint of the northeastern portion of the island to an area approximate to habitats that existed in the

[14] The DWH Administrative Record can be found at www.doi.gov/deepwaterhorizon/adminrecord.

[15] The Gulf Spill Restoration website can be found at www.gulfspillrestoration.noaa.gov.

early 1900s and would directly complement similar efforts currently planned on the southeastern section of Cat Island funded through the RESTORE Act.

2.0 Restoration Planning Process

NRDA restoration under OPA is a process that includes evaluating injuries to natural resources and their services to determine the types and extent of restoration needed to address the injuries. Restoration activities need to produce benefits that are related to or have a nexus (i.e., connection) to natural resource injuries and service losses resulting from an oil spill. The OPA NRDA regulations (15 CFR part 990) provide factors (also referred to as evaluation standards) to be used by Trustees to evaluate projects designed to compensate the public for natural resource injuries caused by oil spills (15 CFR § 990.54(a)). As part of the NRDA process, the Trustees consider a reasonable range of restoration alternatives[16] before selecting their preferred alternative(s) (15 CFR § 990.53(a)(2)).

The MS TIG developed a screening process, described in this chapter, based on the OPA NRDA regulations at 15 CFR §§ 990.53 and 990.54, to help identify the reasonable range of alternatives evaluated in this RP5/EA. The reasonable range of alternatives is consistent with the DWH Trustees' selected programmatic alternative and the Restoration Goals identified in the PDARP/PEIS. This chapter summarizes the injuries addressed by this RP5/EA and the projects considered in the reasonable range of alternatives. The restoration planning process was also conducted in accordance with the Consent Decree,[17] the Trustee Council's SOPs, and NEPA.

2.1 Summary of Injuries Addressed in this RP5/EA

Chapter 4 of the PDARP/PEIS summarizes the injury assessment, which documents the nature, degree, and extent of injuries from the DWH oil spill to both natural resources and the services they provide. Restoration projects identified in this RP5/EA and in future MS TIG restoration plans are designed to address injuries to Restoration Types in the Mississippi Restoration Area resulting from the DWH oil spill. This RP5/EA proposes alternatives for the Nutrient Reduction (Nonpoint Source) and Birds Restoration Types described in the PDARP/PEIS. This section summarizes the most relevant information from Chapter 4 of the PDARP/PEIS injury assessment and establishes the nexus for restoration planning for these Restoration Types.

2.1.1 Nutrient Reduction (Nonpoint Source)

Excessive nutrient enrichment, or eutrophication, of Gulf Coast estuaries and their watersheds is a chronic threat that can lead to hypoxia (low oxygen levels), harmful algal blooms, habitat losses, and fish kills (PDARP/PEIS Section 5.5.4). Water quality improvements associated with nutrient reduction projects exhibit strong ecological linkages to Mississippi's estuarine and coastal habitats and communities. Reduction of rural and

[16] For the purposes of this RP5/EA, each project evaluated in the reasonable range is considered a separate alternative; therefore, the terms "project" and "alternative" are used interchangeably.

[17] Consent Decree, *United States v. BPXP et al.*, Civ. No. 10-4536, (E.D. La. Apr. 4, 2016), centralized in MDL 2179, In re Oil Spill by the Oil Rig "Deepwater Horizon" in the Gulf of Mexico, on April 20, 2010 (E.D. La.).

municipal nonpoint source pollution can be achieved by implementing and improving watershed best management practices. Examples of restoration actions include reducing erosion and thus sedimentation into coastal streams and managing excess nutrient levels to coastal basins. Funds have been allocated for four Nutrient Reduction (Nonpoint Source) projects in the Mississippi Restoration Area: (Portal IDs 96, 358, 359, and 381).

2.1.2 Birds

At least 93 species of birds, including both resident and migratory species across all five Gulf Coast states, were exposed to DWH oil in multiple northern Gulf habitats, including: open water, islands, beaches, bays, and marshes. Laboratory studies showed that exposure to DWH oil led to injuries, including feather damage, abnormal blood attributes, organ damage, and death (Section 4.7 in the PDARP/PEIS). The Trustees estimated that between 51,600 and 84,500 birds died because of the DWH oil spill. Of those quantified dead birds, breeding-age adults would have produced an estimated 4,600 to 17,900 fledglings. The Trustees recognize that additional injury occurred that is unquantified; true bird mortality is likely closer to the upper ranges than the lower (PDARP/PEIS, Section 4.7.5).

Bird injury in the Mississippi Restoration Area has been partially addressed through land acquisition and habitat management projects (Portal IDs 112 and 113), a bird stewardship and enhanced monitoring project (Portal ID 313), and through secondary benefits from other projects.

2.2 Screening for a Reasonable Range of Alternatives

In developing a reasonable range of alternatives suitable for addressing the injuries caused by the DWH oil spill, the MS TIG considered the Trustees' programmatic Restoration Goals and Restoration Type-specific goals specified in the PDARP/PEIS, the evaluation standards in the OPA NRDA regulations (15 CFR § 990.54), input from the public, the current and future availability of funds under the DWH NRDA settlement payment schedule, projects already funded by the MS TIG or other DWH restoration funding sources (e.g., NFWF-GEBF, RESTORE Act), and projects already funded or proposed to be funded by other sources. Consistent with Section 9.4.1.4 of the Trustee Council's SOPs, the MS TIG considered project ideas submitted by the public. Additional information about the screening process applied by the MS TIG to generate a reasonable range for this RP5/EA is provided below.

2.2.1 MS TIG Screening Process

On May 8, 2024, the MS TIG requested submissions of public project ideas through June 7, 2024 to support their restoration planning efforts. To be considered for this RP5/EA, new project ideas must have been submitted or previously submitted project ideas updated between January 1, 2018, and June 7, 2024. The MS TIG's screening process for this RP5/EA involved reviewing ideas submitted through both the DWH NRDA project submission portal and the MDEQ project portal. As outlined in the project solicitation, the MS TIG requested input on potential project ideas for the following Restoration Types:

- Wetlands, Coastal, and Nearshore Habitats
- Nutrient Reduction - Nonpoint Source (NR)
- Sea Turtles

- Marine Mammals
- Birds
- Oysters

The MS TIG eliminated duplicate project ideas, further developed projects of similar or overlapping scope, used components of submitted projects, utilized information in regional management plans, relied on resource expertise within the MS TIG, and consulted with relevant resource agencies in order to develop the reasonable range of alternatives. Project review and screening took place through stages and application of criteria identified below and summarized in Figure 2-1.

To begin the restoration project idea screening process, the MS TIG compiled project ideas from the Trustee Council Project Submission Portal and the MDEQ Restoration Project Idea Portal, and used a series of key words to identify projects related to each Restoration Type listed above from the call for project ideas and binned the projects into their appropriate Restoration Types. Many projects were binned under more than one Restoration Type. This resulted in a total of 572 projects considered, including:

- 475 Wetlands, Coastal, and Nearshore Habitats
- 418 Nutrient Reduction (Nonpoint Source)
- 323 Sea Turtles
- 213 Marine Mammals
- 320 Birds
- 354 Oysters

2.2.2 Step 1- Eligibility Screening

The MS TIG completed Step 1, eligibility screening, of the 572 projects. The MS TIG screened out projects that did not seem to benefit the relevant Restoration Types in the Mississippi Restoration Area. This step resulted in a total of 293 projects remaining after screening criteria were applied (Figure 2-1):

- 72 Wetlands, Coastal, and Nearshore Habitats
- 50 Nutrient Reduction (Nonpoint Source)
- 69 Sea Turtles
- 42 Marine Mammals
- 52 Birds
- 8 Oysters

2.2.3 Step 2- Initial Project Screening

The MS TIG next screened the 293 projects from Step 1 against the Notice of Solicitation of Project Ideas to determine which, if any, of the corresponding restoration approaches listed in the Notice applied to the project ideas (Figure 2-1).

This step resulted in a total of 101 projects remaining after screening criteria were applied:

- 0 Wetlands, Coastal, and Nearshore Habitats

- 49 Nutrient Reduction (Nonpoint Source)
- 0 Sea Turtles
- 0 Marine Mammals
- 52 Birds
- 0 Oysters

Projects were eliminated at this step based on a consideration of several factors, including 1) whether the project could be implemented within the overall budget available for this restoration plan considering all restoration types and 2) whether the timing of the project is right considering other ongoing efforts and availability of technical information. Due to these factors, the MS TIG decided not to pursue Oysters, Wetlands, Coastal and Nearshore Habitats, Sea Turtles, or Marine Mammals restoration type projects in RP5/EA.

2.2.4 Step 3- MS TIG Initial Screening

The MS TIG completed Step 3 (MS TIG Initial Screening) on the 101 Nutrient Reduction (Nonpoint Source) and Birds projects carried forward from Step 2. Step 3 captured the specific considerations the MS TIG prioritized for identifying projects to include in this RP/EA. These criteria were developed by the MS TIG to aid in screening and are consistent with overall MS TIG program goals, taking into consideration prior and ongoing restoration activities of both the MS TIG and other restoration programs.

In Step 3, Nutrient Reduction (Nonpoint Source), and Birds Restoration Type projects were reviewed to evaluate the proposed scope in relation to a variety of project-specific considerations:

- The project has a clear nexus to injuries caused by the DWH oil spill, and the project proposes to partially restore those injuries.
- The project can be implemented within the budget available (per Restoration Type) for this RP/EA, or there is a source of other funds that can be leveraged in conjunction with NRDA funds available to allow implementation. For this planning cycle, the MS TIG was considering a slate of projects up to approximately $24.9 million (M) for all Restoration Types based on availability of funds.
- The cost to carry out the alternative (e.g., cost compared to restoration benefits).
- The project has not already been funded.
- The project can be initiated in a reasonable time frame.
- The project does not seem to have a significant potential to result in adverse environmental or human health impacts.
- There are no other impediments to carrying the project forward as part of the reasonable range of alternatives designated for more detailed OPA and NEPA analysis (e.g., compliance issues).
- The project is appropriate for the Mississippi Restoration Area.
- The project focuses on one or more of the following restoration approaches:

- Nutrient Reduction (Nonpoint Source)
    - Reduce nutrient loads to coastal watersheds
    - Reduce pollution and hydrologic degradation in coastal watersheds
    - Create, restore, and enhance coastal wetlands
    - Protect and conserve marine, coastal, estuarine, and riparian habitats
    - Monitoring and adaptive management/research
- Birds
    - Restore and conserve bird nesting and foraging habitat
    - Prevent incidental bird mortality
    - Monitoring and adaptive management/research

At this point in the screening process, projects related to sea turtles, marine mammals, and wetlands, coastal, and nearshore habitats were eliminated because the MS TIG wanted to preserve flexibility to address future resource needs. This step resulted in a total of five projects: two Nutrient Reduction (Nonpoint Source) and three Birds projects (Figure 2-1).

2.2.5 Step 4-Initial OPA Ranking

The fourth screening step ensured that projects considered in this RP5/EA were compliant with the six OPA NRDA evaluation standards provided at 15 CFR § 990.54(a) including:

a) The cost to carry out the alternative;

b) The extent to which each alternative is expected to meet the Trustees' goals and objectives in returning the injured natural resources and services to baseline and/or compensating for interim losses;

c) The likelihood of success of each alternative;

d) The extent to which each alternative will prevent future injury and avoid collateral injury as a result of implementing the alternative;

e) The extent to which each alternative benefits more than one natural resource and/or service; and

f) The effect of each alternative on public health and safety.

Two Nutrient Reduction (Nonpoint Source) projects and three Birds Projects progressed to Step 5.

2.2.6 Step 5-Additional MS TIG Screening Considerations

During the final screening step, the MS TIG considered the following question: Does the cost of the proposed project fit within the expected NRDA available funding for the MS TIG?

The MS TIG decided that all five of the projects considered in Step 5 met this criterion; therefore, all five projects are included in the Reasonable Range of Alternatives for MS TIG RP5/EA.

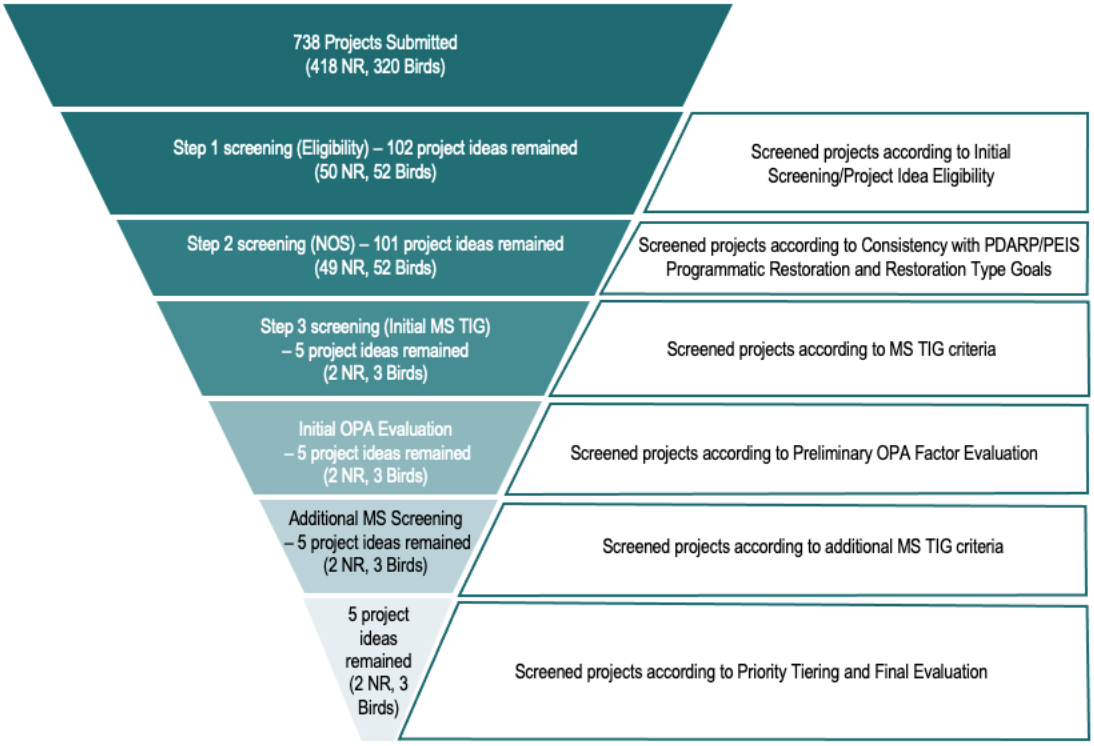

Figure 2-1: Screening Process for Nutrient Reduction and Birds

2.3 Alternatives Not Considered for Further Evaluation in this RP5/EA

The MS TIG's decision to advance five of the 572 project ideas to the reasonable range of alternatives is based on balancing the considerations outlined above in the context of the full suite of restoration projects previously funded by the MS TIG. In some cases, project ideas met or nearly met screening criteria but: (1) needed further technical development; (2) did not align as closely as other projects with the priorities of the MS TIG; or 3) the timing was not ideal. Project ideas not included in the reasonable range of alternatives for this RP5/EA, or not selected for implementation in the final RP5/EA, may be considered for future restoration planning.

2.4 Reasonable Range of Restoration Alternatives Considered

From the screening process described above, the MS TIG identified a reasonable range of two Nutrient Reduction (Nonpoint Source) and three Birds restoration alternatives for further consideration and evaluation in this RP5/EA (Table 2-2). Summaries of each of these alternatives are provided in the following subsections of this chapter. OPA NRDA and NEPA evaluations of these alternatives are provided in Chapters 3 and 4 of this RP5/EA, respectively. A No Action alternative was analyzed for each Restoration Type in this RP5/EA as a baseline for comparison of potential environmental consequences of the action alternatives.

Table 2-1: Reasonable Range of Alternatives Considered in this RP5/EA

Alternative	Estimated Project Costs
Nutrient Reduction (Nonpoint Source) (NR)	
NR1. Nutrient Reduction and Hydrologic Restoration in Moss Point, MS	$6,000,000
NR2. Big Cedar Creek-West Pascagoula River Nutrient Reduction	$2,500,000
Birds	
Birds1. Lower Mississippi River Valley Migratory Bird Habitat Enhancement	$5,500,000
Birds2. Restoration of Shorebird Habitat on Cat Island, MS	$8,000,000
Birds3. Increased Nesting Success through Predator Management on Mainland Beaches	$500,000

2.5 Project Descriptions: Nutrient Reduction (Nonpoint Source)

This RP5/EA identifies two restoration alternatives consistent with the Restore Water Quality Restoration Goal (PDARP/PEIS Section 5.4.5) and underlying NR Restoration Type (PDARP/PEIS Section 5.5.4):

- NR1. Nutrient Reduction and Hydrologic Restoration in Moss Point, MS
- NR2. Big Cedar Creek-West Pascagoula River Nutrient Reduction

Descriptions of these restoration alternatives are provided below.

2.5.1 NR1, Nutrient Reduction and Hydrologic Restoration in Moss Point, MS

Restoration Approaches

Reduce nutrient loads to coastal watersheds; reduce pollution and hydrologic degradation to coastal watersheds (PDARP/PEIS Appendix 5.D.2.1, 5.D.2.2)

Restoration Techniques

Forestry management practices; low impact development practices; erosion and sediment control practices (PDARP/PEIS Appendix 5.D.2.1 and 5.D.2.2)

Project Goal

Improve water quality in the Mississippi Sound through nutrient load reduction in a coastal urban setting

Project Location

City of Moss Point, Mississippi (Figure 2-2)

Project Summary

This project would be implemented by the MDEQ and would include co-located hydrologic and stormwater system enhancements to directly address nutrient loading in Moss Point, MS. This would be accomplished through the construction of a nature-based stormwater park and urban reforestation in the watershed.

First Street Stormwater Park: The proposed stormwater park component would be designed to capture and filter runoff that currently overwhelms existing stormwater infrastructure. Nutrient sources include new construction, local fertilizer use, organic materials, pet waste, roadways, and other impervious surfaces. During storm events, storm sewers downstream of the stormwater park overflow, occasionally causing sewer clean-out pipes in residential yards to overflow in the Rose Drive area. Stormwater retention and treatment in the First Street Stormwater Park would also serve to reduce storm sewer overflows in the area.

Khayat Park Reforestation: This component would fund the reforestation of Khayat Park, which is located in the vicinity of the proposed stormwater park, both of which are located within the City of Moss Point. This area is currently open space and is located adjacent to a large conveyance ditch that drains into Bayou Casotte. This portion of the project would increase urban forest in the city landscape to increase rainfall interception, enhance stormwater infiltration into soil, restore a more natural hydroperiod for water runoff entering coastal waterbodies, and reduce water quality impacts from polluted stormwater. The reforestation effort would utilize native plant species known to be effective at reducing stormwater flows.

General Project Activities and Implementation Timing

First Street Stormwater Park: Stormwater parks and other nature-based solutions (NbS) can be an effective means of reducing runoff in urban areas and serve as important complements to existing stormwater systems. This design would include upgrading stormwater infrastructure to direct water flow from existing ditches to the stormwater park in order to reduce nutrient pollution in coastal streams that lead to the Mississippi Sound. A shallow infiltration basin/landscape that includes native plantings (woody and herbaceous plants) would be constructed to capture stormwater, allowing significant time for infiltration and nutrient reduction. Ponding would be limited, temporary, and would occur primarily during rain events and for brief periods after storm events. Stormwater would

infiltrate and saturate soils similar to a seasonal inundated/saturated wetland landscape. The park would be designed with adequate capacity to handle relatively more common storm events (e.g., 1- to 3-year storm events). For storms that produce stormwater volumes at rates that exceed the capacity of the facility, overflow would be directed to the municipal stormwater system.

In addition to the naturalized detention landscape designed to temporarily hold and filter runoff, the park would also contain approximately five pervious parking spaces to promote infiltration.

The project has been designed to 30% plans and specifications including HEC-RAS modeling[18] to model water flow for a typical one year 24-hour storm scenario to determine the effect of stormwater interception, treatment and reduction in volumes south of the site in the Bayou Cassotte watershed. It is estimated that there would be 1- to 4-inch reduction in stormwater levels between the stormwater facility, surrounding areas, and south to Bayou Cassotte/Hwy 90. Through efforts by local government, there has been community and stakeholder engagement with residents and municipal leaders. Project funding would be used for 100% design, permitting, construction, and monitoring.

Khayat Park Reforestation: The reforestation effort would increase water infiltration and evapotranspiration in the project area prior to stormwater entering coastal streams that drain to the Mississippi Sound. Native vegetation would be planted in the area including a mixture of small, medium, and large trees as well as native shrubs. Additionally, the project would construct a bioswale in the park that would filter stormwater and promote native wetland plants. Project funding would be used for 100% design, permitting, construction, and monitoring.

Activities to be Funded:

1. Planning, engineering and design, and permitting.
2. Construction of project features through the construction of a stormwater park and the planting of native vegetation to create an urban forest.
3. The term of the project would be seven years including monitoring. A Monitoring and Adaptive Management (MAM) plan is attached in Appendix A. Monitoring metrics would include area (project footprint) and water quality improvements through nutrient reduction.

No recreational components associated with development and construction of the project would be funded through this RP/EA.

[18] https://www.hec.usace.army.mil/confluence/rasdocs/rasum/latest/introduction-to-hec-ras

Maintenance

The City of Moss Point and Jackson County would be responsible for maintaining the project areas. Re-planting of failed plants during the monitoring period would be accomplished with NRDA funds.

Costs

The total estimated project cost is $6,000,000, which includes planning, implementation, monitoring, oversight, and contingency.

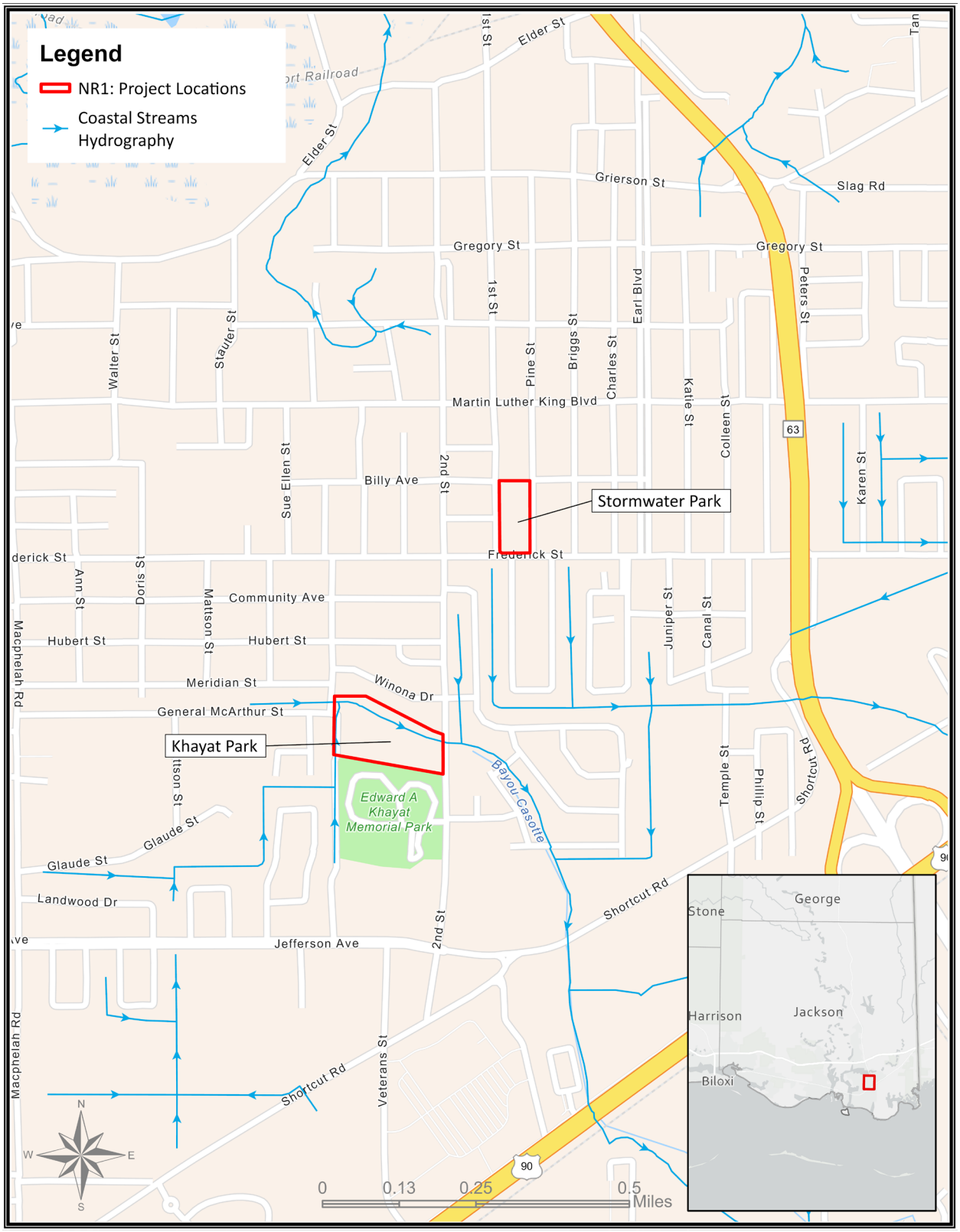

Figure 2-2: NR1, Nutrient Reduction and Hydrologic Restoration in Moss Point, MS: General Project Location

2.5.2 N2, Big Cedar Creek-West Pascagoula River Nutrient Reduction

Restoration Approaches

Reduce nutrient loads to coastal watersheds; reduce pollution and hydrologic degradation to coastal watersheds (PDARP/PEIS Appendix 5.D.2.1, 5.D.2.2)

Restoration Technique

Agricultural conservation practices; forestry management practices (PDARP/PEIS Appendix 5.D.2.1)

Project Goal

Water quality improvement through nutrient and sediment reduction

Project Location

12-Digit hydrologic unit codes (HUC) — George and Jackson Counties, Mississippi:

1. 031700060107 – Lyons Creek-Big Cedar Creek
2. 031700060108 – Indian Creek-Pascagoula River
3. 031700060104 – Plum Bluff Cutoff-White Creek
4. 031700060301 – Black Creek-Pascagoula River

(Figure 2-3)

Project Summary

USDA would implement the project in the Big Cedar Creek and West Pascagoula River watersheds to improve water quality by implementing conservation practices that reduce nutrient and sediment runoff.

USDA and its conservation partners would help landowners adopt management strategies to manage nutrients and sediments from their farming operations on a voluntary basis. Exemplar practices are provided here: Nutrient Reduction Exemplar Practices.pdf.

General Project Activities and Implementation Timing

The Implementing Trustees for this proposed project would be USDA, USEPA, and MDEQ. Conservation plans would be developed and implemented on agricultural and forested landscapes to address nutrient and sediment runoff.

The USDA would provide outreach and technical assistance to voluntary participants (private landowners and local units of government), especially on the most vulnerable acres in the watersheds, to develop conservation plans and implement nutrient reduction-related conservation practices. The project proposes to implement clusters of projects within the smallest watershed practicable with the goal of making a discernible difference in water quality at the watershed level.

While this targeted and concentrated approach is desired, the project's proponents understand the voluntary nature of conservation implementation and would strive to reach the critical sources within the watershed. The proposed conservation practices would

reduce nutrient and sediment losses from the landscape, reduce nutrient and sediment loads to streams and downstream receiving waters, and reduce water quality degradation in watersheds, which could benefit coastal watersheds and marine resources.

Activities to be Funded:

1. Program Oversight and Management
2. Conservation Planning/Environmental Compliance/Engineering and Design
3. Implementation (non-construction)
4. Implementation (construction)
5. Short-term Operations and Maintenance
6. The term of the project would be five years including monitoring. This project has not been identified at this time as a preferred alternative by the MS TIG; therefore, a project MAM plan has not been developed.

Maintenance

Operations and maintenance of restoration activities, Best Management Practices (BMPs), and conservation practices would be included in this project and coordinated with the stakeholders during the planning/implementation phases of the project.

Costs

The total estimated project cost is $2,500,000, which includes planning, implementation, project performance monitoring, oversight, and contingency.

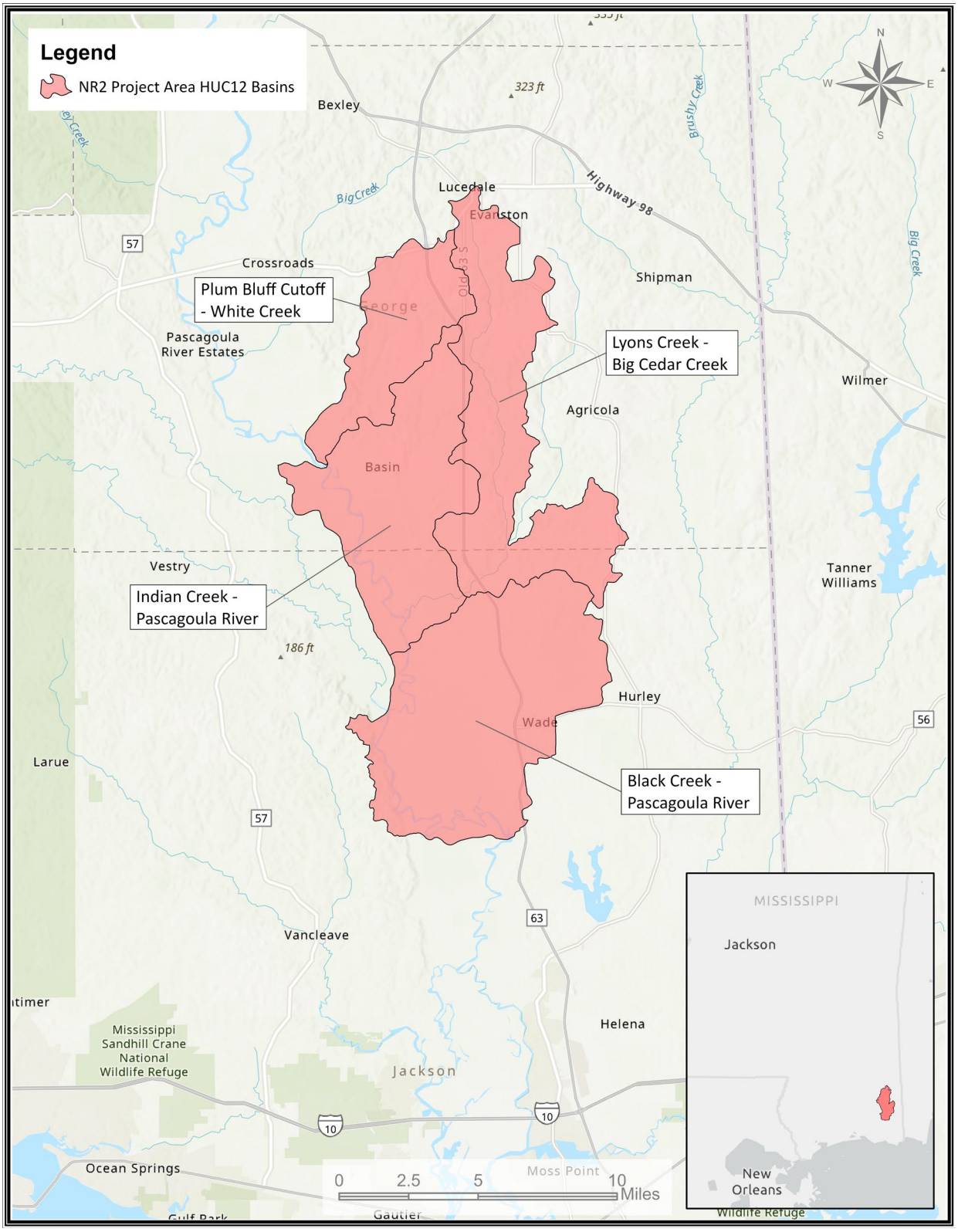

Figure 2-3: NR2, Big Cedar Creek-West Pascagoula River Nutrient Reduction Project Location

2.6 Project Descriptions: Birds

This RP5/EA identifies three restoration alternatives consistent with the Replenish and Protect Living Coastal and Marine Resources Restoration Goal (PDARP/PEIS Section 5.4.5) and underlying Birds Restoration Type (PDARP/PEIS Section 5.5.12):

- Birds1. Lower Mississippi River Valley Migratory Bird Habitat Enhancement
- Birds2. Restoration of Shorebird Habitat on Cat Island, MS
- Birds3. Increased Nesting Success through Predator Management on Mainland Beaches

Descriptions of these restoration alternatives are provided below.

2.6.1 Birds1, Lower Mississippi River Valley Migratory Bird Habitat Enhancement

Restoration Approach

Restore and conserve bird nesting and foraging habitat (PDARP/PEIS Appendix 5.D.6.1)

Restoration Technique

Increase availability of foraging habitat at inlands, managed moist-soil impoundments, agricultural fields, and aquaculture ponds and enhance habitat through vegetation management (PDARP/PEIS Appendix 5.D.6.1)

Project Goals

Restore/improve habitat conditions to benefit multiple species of migratory birds affected by the 2010 DWH oil spill

Project Location

Lower Mississippi River Valley (Figure 2-4)

Project Summary

This project would be co-implemented by the MDEQ and DOI, with project partner Ducks Unlimited. The Lower Mississippi River Valley (LMRV) remains an area of significant importance in sustaining healthy migratory bird habitats and populations that stage or overwinter in the Gulf of America and within the Mississippi Restoration Area. Nearly 40% of North America's waterfowl and 60% of all U.S. bird species migrate or winter in the LMRV. Wetland habitat creation, stewardship, and management are needed to provide stopover habitat and wintering habitat for these migratory birds. The proposed project would build upon a 2020 NFWF-GEBF project, through MDEQ, which enhanced and actively managed wetland management units in multiple National Wildlife Refuges (NWRs) and Wildlife Management Areas (WMAs) in the LMRV. Monitoring of bird habitat use followed project implementation and additional locations in need of wetland management unit improvements similar to those funded in the NFWF-GEBF project have been identified (See Figure 2-4). Restoration activities are proposed at multiple sites to restore/improve habitat conditions to benefit multiple species of migratory birds affected by the 2010 DWH oil spill. The primary objective is to ensure that adequate shallow-water habitat is maximized within

the project areas to meet or exceed the foraging requirements of shorebirds, wading birds, and waterfowl during their migration to and from the Gulf. By increasing available shallow-water habitat, which increases food resources, populations of these species are expected to benefit through greater overwinter survival and increased breeding success the following year.

The project would enhance and actively manage existing wetland management units in multiple NWRs and WMAs in the LMRV, in order to restore/improve habitat conditions to benefit multiple species of migratory birds that were injured by the 2010 DWH oil spill.

The following activities are included in the proposed scope of work:

1. Planning, engineering and design, and permitting
2. Heavy clearing (including mulching and chipping) to provide early successional emergent wetland habitat to establish herbaceous and woody control
3. Chemical treatment of unwanted vegetation
4. Using large excavators and bulldozers for addition and replacement of water control structure construction, enhancement, widening, repair, replacement, and removal to form manageable impoundments which have positive drainage and function properly
5. Using large excavators and bulldozers to ensure wetland units function properly as intended, by removal of debris and grading
6. Enhancement of wildlife openings by use of conventional tractors, bush hoggs and disks
7. Supplement on-going moist-soil management with Japanese millet plantings for wintering waterfowl
8. Controlling unwanted vegetation by chemical treatment and conducting/supplementing on-going moist-soil management
9. Implementation of water delivery systems, including installation of new wells to allow for annual flooding capabilities
10. Cleaning and sloping drainage ditches
11. The term of the project would be seven years including monitoring. A MAM plan is attached in Appendix A. Monitoring metrics would include bird conservation Improvements, abundance of birds, and density of birds.

Maintenance

For the WMAs, Mississippi Department of Wildlife, Fisheries and Parks (MDWFP) is the owner and would maintain the improvements after the project is over. For the NWRs, U.S. Fish and Wildlife Service (USFWS) is the owner and would maintain the improvements after the project is over.

Costs

The total estimated project cost is $5,500,000, which includes planning, implementation, project performance monitoring, oversight, and contingency.

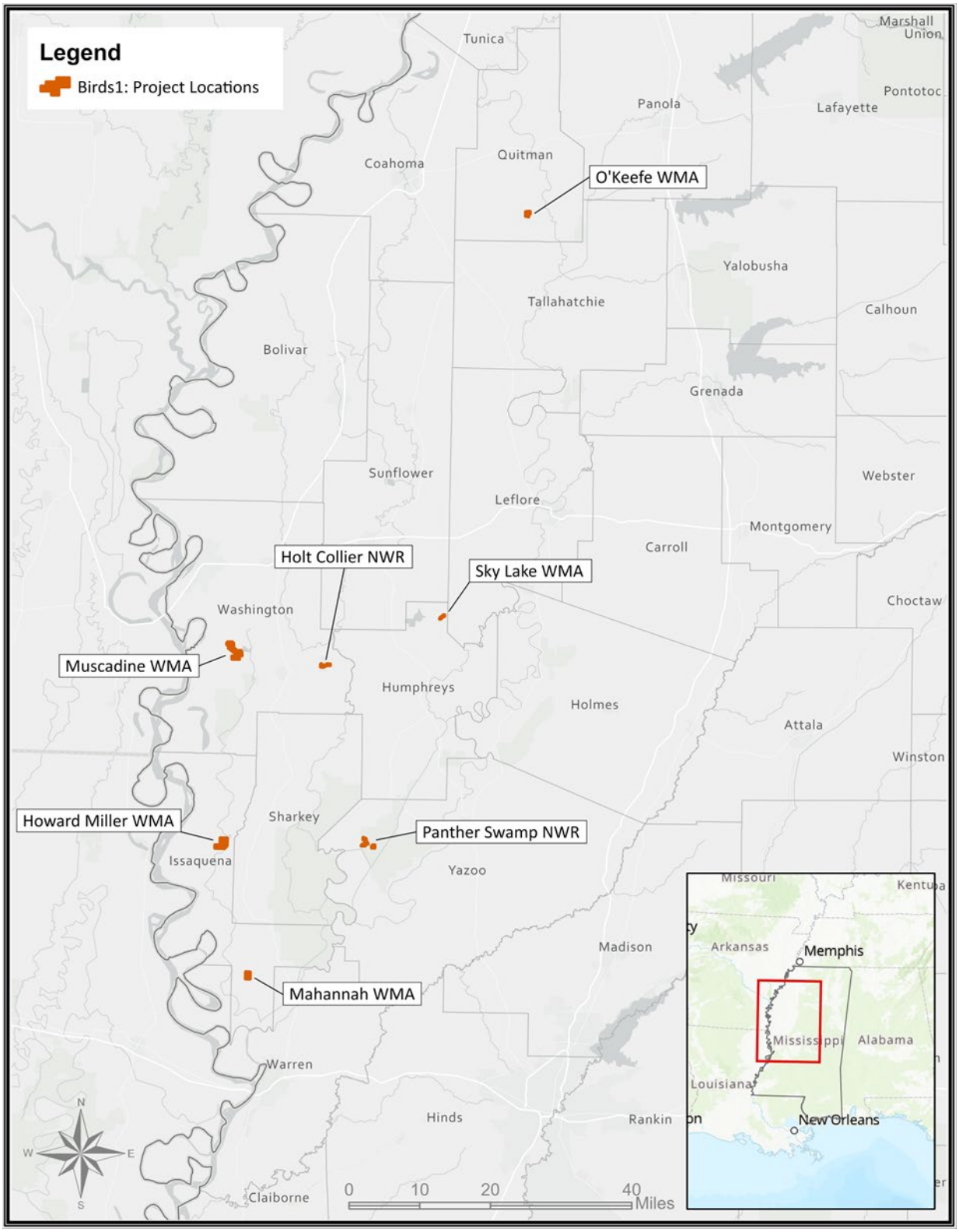

Figure 2-4: Birds1, Lower Mississippi Valley Migratory Bird Habitat Enhancement General Project Location

2.6.2 Birds2, Restoration of Shorebird Habitat on Cat Island, MS

Restoration Approaches

Restore and conserve bird nesting and foraging habitat (PDARP/PEIS 5.5.12.2 and 5.D.6.1); restore and enhance dunes and beaches (PDARP/PEIS 5.5.12.2 1); create, restore, and enhance barrier and coastal islands and headlands (PDARP/PEIS Appendix 5.5.12.2)

Restoration Technique

Enhance habitat through vegetation management (PDARP/PEIS 5.D.6.1); create or enhance coastal wetlands through placement of dredged material (PDARP/PEIS 5.D.1.1)

Project Goals

Restore beach and dune habitat for shorebirds on Cat Island through the dredging and placement of sand resources along the northeastern tip of Cat Island that is similar to existing shoreline habitat (See Figure 2-5)

Project Location

Cat Island, Harrison County, MS (Figure 2-5)

Project Summary

The Implementing Trustee for this project would be MDEQ. Creation of beach/dune habitat would provide significant nesting and foraging opportunities for Mississippi's shorebird population and directly complement similar efforts on state owned land in the southeastern section of Cat Island funded through the RESTORE Act. The overall project would restore the historical footprint of the northeastern portion of the island to an area approximate to habitats that existed in the early 1900s, totaling approximately 100 acres. Source material will be confirmed during engineering and design, and will either be nearshore borrow areas (Figure 2-5) or beneficial use material.

If a separate dredging project is identified to provide the source material for beneficial placement for this project, the environmental compliance, including NEPA, would be performed for the dredge project area prior to commencement of the work, in compliance with all applicable federal and state laws. Dredging and placement would be conducted to depths and in quantities to be determined during final design and in accordance with any required federal and state permits.

This project would provide full engineering and design, permitting, and construction of the project footprint.

General Project Activities and Implementation Timing

The project would create and enhance coastal and nearshore habitats through the dredging and placement of sand resources to benefit nesting shorebird species.

Activities to be funded:

1. Planning, engineering and design, and permitting.

2. Construction of restoration features through the dredging and placement of sand resources including the planting of native vegetation to stabilize beach/dune habitat.
3. The term of the project would be eight years including monitoring. A MAM plan is attached in Appendix A. Monitoring metrics would include acres of bird habitat created/restored and bird abundance.

Maintenance

No short- or long-term maintenance is anticipated.

Costs

The total estimated project cost is $8,000,000, which includes planning, implementation, project performance monitoring, maintenance, oversight, and contingency.

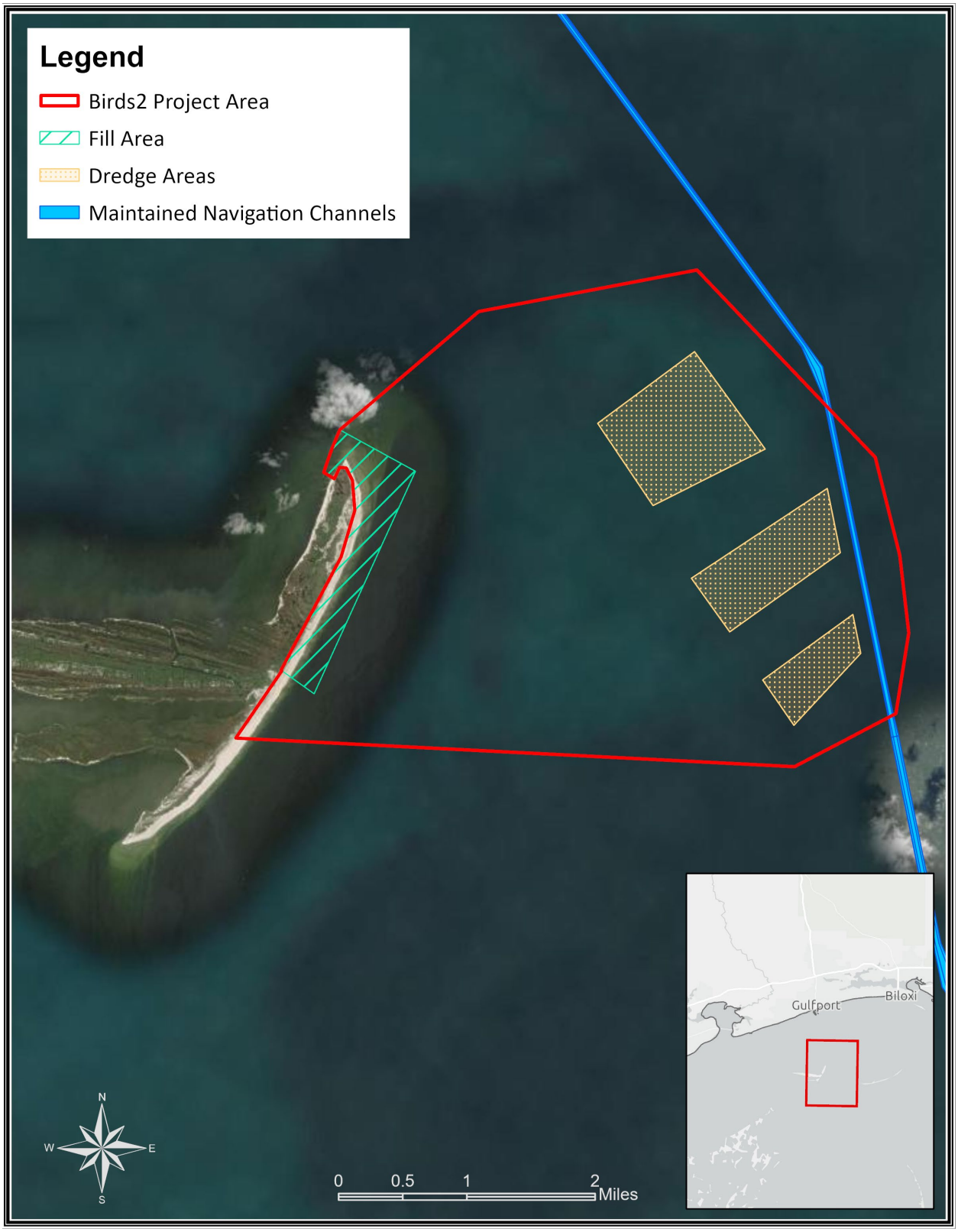

Figure 2-5: Birds2, Restoration of Shorebird Habitat on Cat Island, MS Project Location

2.6.3 Birds3, Increased Nesting Success through Predator Management on Mainland Beaches

Restoration Approach

Prevent incidental bird mortality (PDARP/PEIS Appendix 5.D.6.3)

Restoration Techniques

Nesting and foraging area stewardship (PDARP/PEIS Appendix 5.D.6.1)

Project Goals

This proposed project would create and implement a predator management strategy to reduce their impact on injured species like the Least Tern (*Sternula antillarum*). There would also be opportunities to promote environmental stewardship, education, and outreach.

Project Location

Mainland coastal beaches in the three coastal counties (Hancock, Harrison and Jackson) (Figure 2-6)

Project Summary

An increase in predators on mainland beaches in coastal Mississippi has been observed in recent years. The project would be implemented by MDEQ using a predator management strategy, to be conducted in an adaptive management framework in order to identify the methods that provide the optimal mix of effectiveness and cost efficiency for each predator species.

General Project Activities and Implementation Timing

A predator management strategy would be developed based on an existing USFWS management strategy that was that was developed under the DWH NRDA project, Dauphin Island West End Acquisition and implemented in another DWH NRDA Project, Stewardship of Coastal Alabama Beach Nesting Bird Habitat. More aggressive or costly actions such as lethal control, capture and translocation, or installation of mammal exclusion fences would be considered for predator species that regularly lead to complete colony failure, such as raccoons, foxes, and Great Horned Owl. Deterrent actions or habitat management actions that reduce predator use of the surrounding landscape would be used when aggressive methods are not feasible or desirable and for species that regularly prey on eggs or chicks but are rarely responsible for complete colony failure (e.g., Fish Crows (*Corvus ossifragus*), gulls (*Leucophaeus atricilla, Larus delawarensis*, *Larus smithsonianus)* and Gull-billed Terns (*Gelochelidon nilotica*)). Specific actions might include pre-season aversion training using quail eggs injected with a distasteful but harmless chemical, perch removal or modification, and installation of wildlife-proof lids on trash cans located on the beach near colonies. Methods chosen would be implemented across the coast in a design to maximize information gain about the relative effectiveness of each method. Data collected during follow-up monitoring would be used to inform a long-term predator management plan for the benefit of mainland Least Terns.

Activities to be funded:

1. Development and implementation of a predator management strategy.
2. The term of the project would be approximately five years including monitoring. This project has not been identified at this time as a preferred alternative by the MS TIG; therefore, a project MAM plan has not been developed.

Maintenance

No short- or long-term maintenance would be required.

Costs

The total estimated project cost is $500,000, which includes planning, implementation, project performance monitoring, oversight, and contingency.

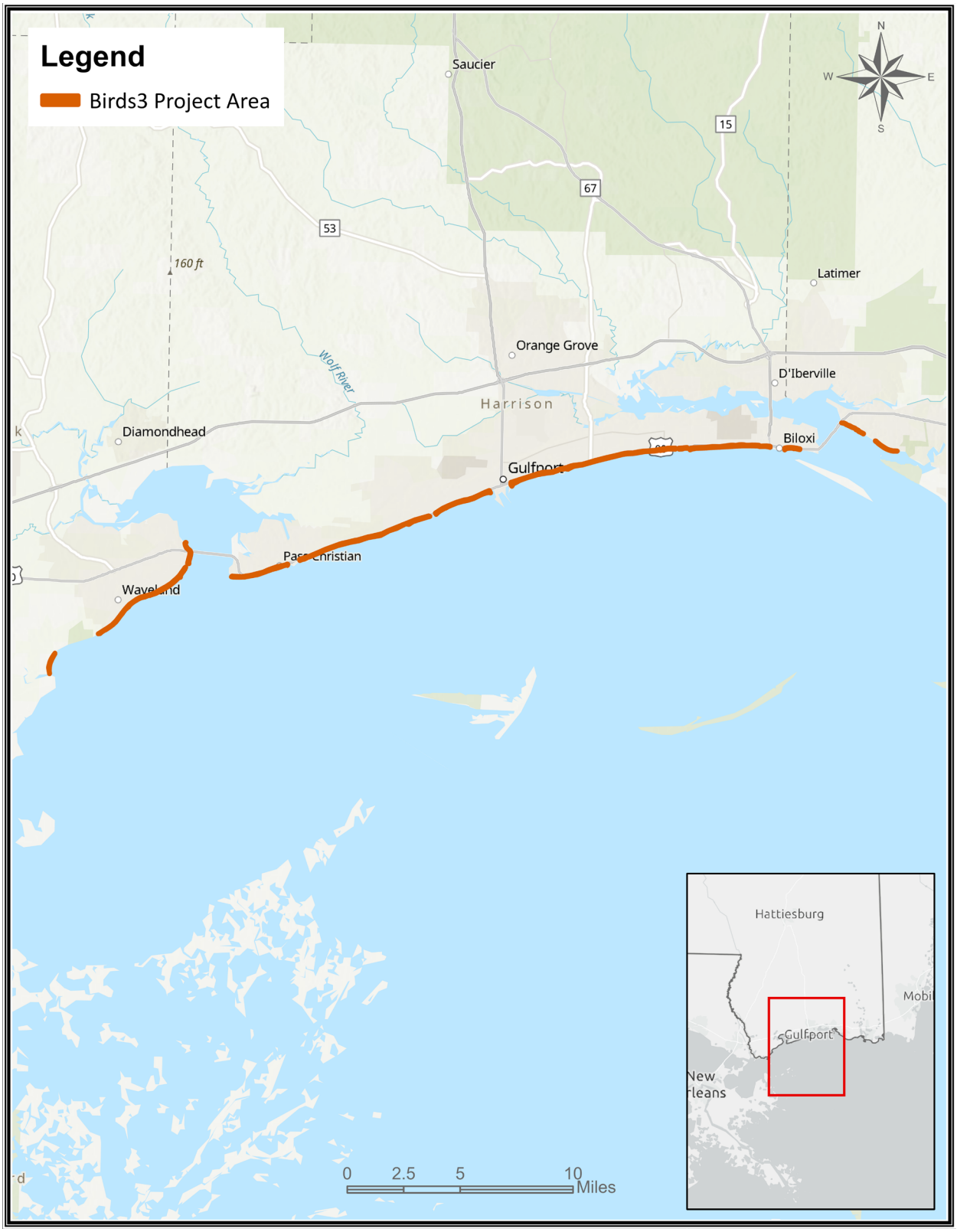

Figure 2-6: Birds3, Increased Nesting Success through Predator Management on Mainland Beaches Project Location

3.0 OPA NRDA Evaluation of Alternatives

The MS TIG developed a reasonable range of restoration alternatives for consideration and evaluation in this RP5/EA. This chapter provides an OPA NRDA analysis of each alternative considered in this RP5/EA. Section 3.1 provides a summary of the OPA NRDA evaluation standards. These are followed by project-specific OPA NRDA evaluations (Section 3.2), the Natural Recovery/No Action Alternative evaluations (Section 3.3), and a summary of conclusions of the OPA NRDA evaluation for all project alternatives (Section 3.4). Discussions of project performance monitoring requirements (Section 3.5), estimated project costs (Section 3.6), and best management practices (BMPs) (Section 3.7) are provided at the end of this chapter.

3.1 Summary of OPA NRDA Evaluation Standards

According to the OPA NRDA regulations, the MS TIG is responsible for identifying a reasonable range of alternatives (15 CFR § 990.53(a)(2)) that can be evaluated according to the OPA NRDA evaluation standards (15 CFR § 990.54(a)). If Trustees conclude that two or more alternatives are equally preferable, the OPA NRDA regulations provide that the most cost-effective alternative must be chosen (15 CFR § 990.54(b)). In this RP5/EA, the MS TIG is evaluating a reasonable range of restoration alternatives and proposing its preferred alternatives, based on these OPA NRDA evaluation standards:

- The cost to carry out the alternative.
- The extent to which each alternative is expected to meet the Trustees' goals and objectives in returning the injured natural resources and services to baseline and/or compensating for interim losses.
- The likelihood of success of each alternative.
- The extent to which each alternative would prevent future injury resulting from the incident and avoid collateral injury resulting from implementing the alternative.
- The extent to which each alternative benefits more than one natural resource and/or service.
- The effect of each alternative on public health and safety.

3.2 OPA NRDA Evaluation of the Reasonable Range of Alternatives

Below is an evaluation of each project in the reasonable range using the OPA NRDA evaluation standards. Full project descriptions for these alternatives are provided in Section 2.4.

3.2.1 NR1, Nutrient Reduction and Hydrologic Restoration in Moss Point, MS (preferred)

This alternative would directly address nutrient loading by co-locating hydrologic and stormwater system enhancements in Moss Point, MS (see Figure 2-2). This would be accomplished through the construction of a nature-based stormwater park and urban

reforestation in the watershed. The proposed stormwater park would be designed to capture and filter runoff that currently overwhelms existing stormwater infrastructure. The reforestation effort would increase urban forest in the city landscape to increase rainfall interception, enhance stormwater infiltration into soil, restore a more natural hydroperiod for water runoff entering coastal waterbodies, and reduce water quality impacts from polluted stormwater. By reducing nutrient pollution in adjacent coastal streams that lead to the Mississippi Sound, there is a clear nexus to that injury from the DWH spill. The total estimated project cost for this alternative is $6 million (see Section 2.4.1.1).

Table 3.2: OPA NRDA Evaluation of NR1 Nutrient Reduction and Hydrologic Restoration in Moss Point, MS

OPA NRDA Evaluation Standard	Evaluation
Cost to Carry out the Alternative	The MS TIG determined that the costs for the alternative ($6 million) are reasonable, appropriate, and comparable to similar projects. The costs to carry out this alternative are based upon a similar project (Bill Gregory Stormwater Project) in Pensacola, Florida.
Trustees' Goals and Objectives	Implementation of this alternative would contribute to the Trustees' goal of restoring water quality by reducing nutrient loading and sediment runoff into Gulf of America coastal watersheds. The project has a clear nexus to injuries as it would help compensate for water quality injuries resulting from the DWH spill.
Likelihood of Success	The alternative would utilize proven stormwater management and reforestation techniques and established methods to reduce nutrient loads and sediment runoff.
Prevent Future Injury and Avoid Collateral Injury	Best practices, conservation measures, and design modifications to avoid and minimize impacts identified during the permitting process or during consultations and reviews with regulatory agencies would be implemented. This alternative would partially restore injuries and reduce any further injury to the damaged resource.
Benefits to Multiple Resources	Through a coordinated and integrated watershed approach, benefits to multiple resources are anticipated from reductions in nutrient and sediment losses in three HUC 12 coastal watersheds: HUC12: 031700080705, Beardslee Lake-Escatawpa River (Stormwater Park); HUC12: 03170009030, Bayou Cassotte-Pt Aux Chenes Bay (Khayat Park), and the common receiving HUC12: 031700060303, Lower West Pascagoula-Pascagoula Rivers. In addition to these direct coastal watershed benefits, benefits to downstream marine resources would be expected, for example, benefits to the Mississippi Sound which contains essential fish habitat and oyster habitat.
Public Health and Safety	Construction activities are not expected to negatively affect public health and safety. MDEQ would comply with all relevant safety measures, practices, and regulations during implementation to maintain a safe, protective environment for those involved with or located near the project.

OPA NRDA Evaluation Standard	Evaluation
Summary: Based on the OPA NRDA evaluation, the MS TIG has identified this project as a preferred restoration alternative in this RP5/EA. The cost is reasonable, and the project has a high likelihood of success. The project would meet Trustees' goals and objectives of restoring water quality by reducing nutrient loading and sediment runoff into Gulf of America coastal watersheds. In addition, benefits to multiple resources would be expected, for example, benefits to the Mississippi Sound which contains essential fish habitat and oyster habitat.	

3.2.2 NR2, Big Cedar Creek – West Pascagoula River Nutrient Reduction (non-preferred)

This alternative would improve water quality by implementing conservation practices in the Big Cedar Creek and West Pascagoula River watersheds that reduce nutrient loading and sediment runoff (see Figure 2-3) to USDA and its conservation partners would help landowners adopt management strategies to manage nutrients and sediments from their farming operations on a voluntary basis. The total estimated project cost for this alternative is $2.5 million (see Section 2.5.2).

Table 3.3: OPA NRDA Evaluation of NR2 Big Cedar Creek – West Pascagoula River Nutrient Reduction

OPA NRDA Evaluation Standard	Evaluation
Cost to Carry out the Alternative	The MS TIG determined that the total estimated cost for the alternative ($2.5 million) is reasonable, appropriate, and comparable to similar projects. The costs to carry out this alternative are based upon a similar project under implementation in the Mississippi Restoration Area, Big-Cedar Creek - Rocky Creek Nutrient Reduction.
Trustees' Goals and Objectives	Implementation of this alternative would contribute to the Trustees' goal of restoring water quality impacted by the DWH oil spill by reducing nutrient loading and sediment runoff into Gulf of America coastal watersheds. The project has a nexus to injuries as it would help compensate for water quality injuries resulting from the DWH spill.
Likelihood of Success	The alternative would utilize proven techniques and established methods to reduce nutrient loads and sediment runoff. The Big-Cedar Creek - Rocky Creek Nutrient Reduction was selected for funding and implementation by the MS TIG for their RP4/EA to develop and implement these conservation practices in the Mississippi Restoration Area, using Exemplar Nutrient Reduction Practices. Given USDA's extensive experience and expertise in conservation practices, and the success and legacy of the USDA - Natural Resources Conservation Service (NRCS) Farm Bill programs, there is a significant opportunity to implement conservation practices on private lands that would reduce the levels of nutrients and sediments entering watersheds that could provide benefits to marine resources and coastal watersheds. However, there are uncertainties relating to landowner participation within the watershed that may hinder project success.
Prevent Future Injury and Avoid Collateral Injury	The conservation practices identified for this alternative were developed by USDA-NRCS according to standards that require use of associated and mitigating practices in a "systems approach" to ensure new injuries do not occur, and those practice standards would be followed. In addition, the MS TIG would ensure compliance with all applicable federal laws, regulations, and executive orders prior to implementation of the alternative by using a site-specific environmental evaluation process carried out during the conservation planning effort. This alternative would partially restore injuries and reduce any further injury to the damaged resource.
Benefits to Multiple Resources	The proposed conservation practices would reduce nutrient and sediment losses from the landscape, reduce nutrient and sediment loads to streams and downstream receiving waters, and reduce water quality degradation in watersheds that could provide benefits to coastal watersheds and marine resources, including essential fish habitat and oyster habitat.
Public Health and Safety	The MS TIG does not anticipate any adverse impacts on public health and safety. Relevant safety measures and practices for the implementation of conservation practices will be followed.

OPA NRDA Evaluation Standard	Evaluation
Summary: Based on the OPA NRDA evaluation, the MS TIG has identified this project as a non-preferred alternative in this RP5/EA. Although the alternative would meet the Trustees' goals and objectives and would benefit multiple resources, low landowner participation within this watershed at this time make this project less likely to succeed when compared to other evaluated nutrient reduction alternatives in the RP5/EA.	

3.2.3 Birds1, Lower Mississippi River Valley Migratory Bird Habitat Enhancement (preferred)

The Lower Mississippi River Valley (LMRV) remains an area of significant importance in sustaining healthy migratory bird habitats and populations that stage or overwinter in the Gulf of America and within the Mississippi Restoration Area. This alternative would build upon a 2020 NFWF-GEBF project, Migratory Bird Habitat Creation in the LMRV (ms-migratory-birds-20.pdf),[19] funded through MDEQ, which enhanced and actively managed wetland management units in multiple NWRs and WMAs in the LMRV in order to restore/improve habitat conditions to benefit multiple species of migratory birds that were injured by the 2010 *Deepwater Horizon* oil spill (see Figure 2-4). Additional locations in need of wetland management unit improvements (wetland habitat creation, stewardship, and management) have been identified to meet or exceed the foraging requirements of numerous shorebirds, wading birds, and waterfowl populations during their migration to and from the Gulf. By increasing available shallow-water habitat, which increases food resources, populations of these species are expected to benefit through greater overwinter survival and increased breeding success the following year (see Section 2.5.4). The total estimated project cost for this alternative is $5.5 million.

Table 3-4: OPA Evaluation of Birds1, Lower Mississippi Valley Migratory Bird Habitat Enhancement

OPA NRDA Evaluation Standard	Evaluation
Cost to Carry Out the Alternative	The MS TIG determined that the total estimated cost for the alternative ($5.5 million) is reasonable, appropriate, and comparable to similar projects. The costs to carry out this alternative are based upon the cost of the 2020 NFWF-GEBF project of the same name, upon which this project builds.

[19] https://www.nfwf.org/sites/default/files/2020-11/ms-migratory-birds-20.pdf

OPA NRDA Evaluation Standard	Evaluation
Trustees' Goals and Objectives	This project is consistent with the Replenish and Protect Living Coastal and Marine Resources Restoration Goal and the underlying Bird Restoration Type project goals including restore or protect habitats on which injured birds rely and restore injured birds by species where actions would provide the greatest benefits with the geographic ranges that include the Gulf. The project has a clear nexus to injuries as it would help compensate for injuries to multiple species of migratory birds injured by the DWH oil spill.
Likelihood of Success	The alternative would utilize proven techniques and established methods in bird habitat restoration as demonstrated by the success of the NFWF-GEBF project in the LMVR and would build upon the previous project activities in order to sustain healthy migratory bird habitats and populations that stage or overwinter in the Gulf of America and within the Mississippi Restoration Area. As such, the MS TIG believes this project is technically feasible and anticipates that it would have a high likelihood of success.
Prevent Future Injury and Avoid Collateral Injury	Best practices, conservation measures, and design modifications to avoid and minimize impacts identified during the permitting process or during consultations and reviews with regulatory agencies would be implemented. This alternative would partially restore injuries and reduce any further injury to the damaged resource.
Benefits to Multiple Resources	In addition to benefitting multiple species of migratory birds injured by the DWH oil spill, the project activities would also provide early successional freshwater wetland habitat.
Public Health and Safety	Construction activities are not expected to negatively affect public health and safety. MDEQ would comply with all relevant safety measures, practices, and regulations during implementation to maintain a safe, protective environment for those involved with or located near the project.
Summary: Based on the OPA NRDA evaluation, the MS TIG has identified this project as a preferred restoration alternative in this RP5/EA. The cost is reasonable, and the project has a high likelihood of success. This project is consistent with the Replenish and Protect Living Coastal and Marine Resources Restoration Goal and would contribute to the Trustees' goals of restoring or protecting habitats on which bird species injured by the DWH oil spill rely. In addition, benefits to multiple resources would be expected, for example, the project activities would create freshwater wetland habitat.	

3.2.4 Birds2, Restoration of Shorebird Habitat on Cat Island, MS (preferred)

This alternative would restore beach and dune habitat for shorebirds on Cat Island similar to existing shoreline habitats through the dredging and placement of sand resources along the northeastern tip of Cat Island (see Figure 2-5). Creation of beach/dune habitat would provide significant nesting and foraging opportunities for Mississippi's shorebird population (see Section 2.5.5). The total estimated project cost for this alternative is $8 million.

Table 3-5: OPA Evaluation of Birds2, Restoration of Shoreline Bird Habitat on Cat Island, MS

OPA NRDA Evaluation Standard	Evaluation
Cost to Carry out the Alternative	The MS TIG determined that the total estimated cost for the alternative ($8 million) is reasonable, appropriate, and comparable to similar projects. The cost to carry out this alternative is based upon similar coastal restoration projects implemented by MDEQ using DWH restoration funds, including the NFWF-GEBF Round Island Marsh Restoration Project.
Trustees' Goals and Objectives	This project is consistent with the Replenish and Protect Living Coastal and Marine Resources Restoration Goal and the following Birds Restoration Type goal to restore or protect habitats on which injured birds rely. The project has a clear nexus to injuries as it would help compensate for injuries to multiple species of shorebirds injured by the DWH oil spill.
Likelihood of Success	The alternative would utilize proven techniques and established methods to create and restore beach and dune habitat for shorebirds.
Prevent Future Injury and Avoid Collateral Injury	Best practices, conservation measures, and design modifications to avoid and minimize impacts identified during the permitting process or during consultations and reviews with regulatory agencies would be implemented. This alternative would partially restore injuries and reduce any further injury by preventing the continued loss of shorebird habitat on Cat Island due to erosion through the placement of sand and vegetative plantings to stabilize beach and dune habitat.
Benefits to Multiple Resources	In addition to providing benefits to birds, this project would create and enhance coastal and nearshore habitats through the dredging and placement of sand resources and planting of native vegetation to stabilize beach/dune habitat. This project's activities may also provide ancillary benefits for other living coastal and marine resources such as sea turtles.
Public Health and Safety	Construction activities are not expected to negatively affect public health and safety. MDEQ would comply with all relevant safety measures, practices, and regulations during implementation to maintain a safe, protective environment for those involved with the project.
Summary: Based on the OPA NRDA evaluation, the MS TIG has identified this project as a preferred restoration alternative in this RP5/EA. The cost is reasonable, and the project has a high likelihood of success. The project would meet Trustees' goals and objectives of restoring or protecting habitats on which birds injured from the DWH oil spill rely. In addition, benefits to multiple resources would be expected, for example, the project activities would provide benefits to the coastal, wetlands and nearshore habitats through the restoration of the historical footprint of the northeastern portion of the island to an area approximate to the early 1900s and may provide ancillary benefits for sea turtles.	

3.2.5 Birds3, Increased Nesting Success through Predator Management on Mainland Beaches (non-preferred)

An increase in predators on mainland beaches in coastal Mississippi has been observed in recent years. This alternative would create and implement a predator management strategy to reduce their impacts on shorebirds (see Figure 2-6), specifically on injured species like the Least Tern. Deterrent actions or habitat management actions that reduce predator use of the surrounding landscape would be used when aggressive methods are not feasible or desirable, and for species that regularly prey on eggs or chicks but are rarely responsible for complete colony failure (e.g., Fish Crows, gulls, Gull-billed Terns). More aggressive or costly actions such as lethal control, capture and translocation, or installation of mammal exclusion fences would be considered for predator species that regularly lead to complete colony failure, such as raccoons, foxes, coyotes, and Great Horned Owl. Methods chosen would be implemented across the coast in a design to maximize information gain about the relative effectiveness of each method. Data collected during follow-up monitoring would be used to inform a long-term predator management plan for the benefit of mainland Least Terns. There would also be opportunities to promote environmental stewardship, education, and outreach (see Section 2.5.6). The total estimated project cost for this alternative is $500,000.

Table 3-6: OPA Evaluation of Birds3, Increased Nesting Success through Predator Management on Mainland Beaches (non-preferred)

OPA NRDA Evaluation Standard	Evaluation
Cost to Carry out the Alternative	The MS TIG determined that the total estimated cost for the alternative ($500,000) is reasonable, appropriate, and comparable to similar projects. The cost to carry out this alternative is based upon costs of development for a predator management strategy that was developed under the DWH NRDA project, Dauphin Island West End Acquisition, and implemented in another DWH NRDA Project, Stewardship of Coastal Alabama Beach Nesting Bird Habitat.
Trustees' Goals and Objectives	This project is consistent with the Replenish and Protect Living Coastal and Marine Resources Restoration Goal and the following Birds Restoration Type goal – restore lost birds by facilitating additional production and/or reduced mortality of injured bird species. The project has a clear nexus to injuries as it would help compensate for injuries to shorebirds injured by the DWH oil spill.

OPA NRDA Evaluation Standard	Evaluation
Likelihood of Success	This project would seek to reduce impacts to birds from predators on Mississippi mainland beaches. The project is technically feasible and would use proven techniques and established methods to develop and implement a predator management strategy in other states. However, it may not be feasible to get approval from local government for some potential project activities such as lethal control, capture and translocation, or installation of mammal exclusion fences based on the nature of their beach maintenance responsibilities as well as potential risks to the public's enjoyment of the beach, thereby diminishing the project benefits. The project would likely be less successful if all techniques were not able to be fully implemented.
Prevent Future Injury and Avoid Collateral Injury	Best practices, conservation measures, and design modifications to avoid and minimize impacts identified during the permitting process or during consultations and reviews with regulatory agencies would be implemented. However, collateral injury could result to wildlife resources if lethal control or capture and translocation were included in the management strategy and those measures were implemented for predator species that regularly lead to complete colony failure, such as raccoons, foxes, coyotes, and Great Horned Owl. This alternative would partially restore injuries and reduce any further injury through the development and implementation of a predator management strategy.
Benefits to Multiple Resources	No benefits to multiple resources.
Public Health and Safety	Project implementation activities are not expected to negatively affect public health and safety. MDEQ would comply with all relevant safety measures, practices, and regulations during implementation to maintain a safe, protective environment for those involved with the project.
Summary: Based on the OPA NRDA evaluation, the MS TIG has identified this project as a non-preferred alternative in RP5/EA at this time. Although the alternative would meet the Trustees' goals and objectives, the project could result in collateral injuries and may be difficult to implement because of the need to seek approval from local government agencies.	

3.3 Natural Recovery

Pursuant to the OPA NRDA regulations, the 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" (15 CFR § 990.53(b)(2)). Under this alternative, the Trustees 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 degradation.

Although injured resources could presumably recover to or near baseline conditions under these scenarios, recovery would take much longer compared to a scenario in which restoration actions are 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 PDARP/PEIS (Section 5.8.2). Based on this determination, tiering this RP5/EA from the PDARP/PEIS, and incorporating that analysis by reference herein, the MS TIG did not evaluate or further consider natural recovery as an alternative under OPA in this RP5/EA.

3.4 OPA Evaluation Conclusions

As described above, the MS TIG conducted an OPA NRDA evaluation of each of the projects included in the reasonable range of alternatives for this RP5/EA. The MS TIG's identification of preferred alternatives is based on this evaluation (described above) and informed by the NEPA analysis presented in Chapter 4.

Table 3-7: OPA NRDA Evaluation Summaries

Preferred Alternatives that make up the Proposed Action for this RP5/EA	Estimated Project Costs
Nutrient Reduction	-
NR1. Nutrient Reduction and Hydrologic Restoration in Moss Point, MS	$6,000,000
Birds	-
Birds1. Lower Mississippi River Valley Migratory Bird Habitat Enhancement	$5,500,000
Birds2. Restoration of Shorebird Habitat on Cat Island, MS	$8,000,000

3.5 Monitoring Requirements

MAM plans for each of the preferred alternatives can be found in Appendix A. These MAM plans outline the monitoring needed to evaluate each alternative's progress toward meeting site-specific performance objectives and the appropriate corrective actions and adaptive management, as applicable. The MAM plans are consistent with 15 CFR § 990.55(b)(3), the requirements and guidelines set forth in the PDARP/PEIS, the TC SOPs, and the Trustees' MAM Manual (DWH Trustees 2017d). The MAM plans are intended to be updated as needed to reflect changing conditions and to incorporate new information as it becomes available. Updates to MAM plans and any additional details concerning the status of monitoring activities would be made publicly available through DIVER. Should a corrective action become necessary as a result of unanticipated conditions, the Implementing Trustee will evaluate the corrective action for consistency with the OPA and NEPA analyses conducted in this RP/EA in accordance with Section 9.5.2 of the TC SOPs.

3.6 Estimated Project Costs

Costs of alternatives included in this RP5/EA reflect estimates based on the most current designs and information available to the MS TIG. Estimated costs reflect all costs associated with implementing the project, potentially including, but not limited to, E&D, permitting, studies, construction/implementation, monitoring and adaptive management, operations and maintenance, Trustee oversight, and contingencies.

3.7 Best Management Practices

The MS TIG incorporates applicable BMPs into planning and design to avoid or minimize impacts on natural resources, including protected and listed species and their habitats. BMPs will be identified in required permits, consultations, or environmental reviews, including those described in Appendix 6.A of the PDARP/PEIS. Once selected for funding, project implementation plans are prepared for each project, outlining roles, responsibilities, and project implementation. The Implementing Trustee is responsible for ensuring that E&D, construction, and implementation of projects will fall within the general scope of the purpose and need, and is consistent with the anticipated benefits as addressed in the OPA NRDA evaluation.

4.0 NEPA ANALYSIS

Under NEPA, federal agencies must comparatively evaluate the environmental effects of the alternatives being considered, including but not limited to impacts on social, cultural, and economic resources, as well as natural resources. To determine whether an action has the potential to result in significant impacts, the 2026 DOI NEPA Procedures recommend that agencies consider the following: both short- and long-term, beneficial and adverse effects on natural resources (physical and biological), effects on public health and safety, economic effects, and the quality of life of the American people. In this RP5/EA, and consistent with the PDARP/PEIS, the MS TIG addresses effects on public health and safety, the economy, and quality of life of the American people under the Socioeconomic category. This category includes considerations for effects on things such as cultural resources, infrastructure, land and marine management, tourism and recreation, aesthetics and visual resources, fisheries and aquaculture, and marine transportation.

The methodology for determining impacts and the definitions of thresholds for each resource category used in preparing this RP5/EA are consistent with those described in Table 6.3-2 (Guidelines for NEPA impact determinations) of the Final PDARP/PEIS, (to which this NEPA analysis is tiered), and are also consistent with DOI NEPA Procedures.[20] In tiering from the PDARP/PEIS, the resource categories evaluated in this RP5/EA are organized in the same structure, i.e., physical, biological, and socioeconomic resources as structured in the PDARP/PEIS. The Final PDARP/PEIS Table 6.3-2 is included in Appendix B.

According to the DOI NEPA Procedures, "'[e]ffects'" or 'impacts' means changes to the human environment from the proposed action or action alternatives that are reasonably foreseeable and have a reasonably close causal relationship to the proposed action or action alternatives." 516 DM 1, Part 6.1(k). Effects include ecological (such as the effects on natural resources and on the components, structures, and functioning of affected ecosystems), aesthetic, historic, cultural, economic (such as the effects on employment), social, local custom and culture, or health. Effects appropriate for analysis under NEPA may be either beneficial or adverse, or both, with respect to these categories. "Adverse" is used in this chapter only to describe the federal Trustees' evaluation under NEPA. This term is defined and applied differently in consultations conducted pursuant to the Endangered Species Act (ESA) and other protected resource statutes.

This chapter provides NEPA analysis for the reasonable range of alternatives considered in this Draft RP5/EA, and pursuant to NEPA includes a No Action alternative analysis for comparative purposes. Restoration types addressed by the action alternatives are Nutrient Reduction (Nonpoint Source) and Birds. The NEPA analysis provides a site-specific affected

[20] 516 DM 1 - U.S. Department of the Interior Handbook of National Environmental Policy Act Implementing Procedures, September 2025 ("DOI NEPA Procedures").

environment description for each project (i.e., alternative) evaluated, as well as a discussion of environmental consequences.

Under the natural recovery/no action alternative, the MS TIG would not select or implement any of the restoration alternatives proposed in this RP5/EA. The Trustees analyzed the natural recovery/no action alternative programmatically in the PDARP/PEIS and found that it would not meet the purpose and need for restoring lost natural resources and their services. That analysis is incorporated herein, and the MS TIG does not further evaluate natural recovery as a viable alternative under the OPA NRDA regulations. Incorporating a no action alternative into EAs is useful because EAs must compare the effects of the proposed action to the future without any additional restoration.

4.1 Minimally Affected Resources Common to Most Alternatives

To avoid redundant or unnecessary detail, Table 4-1 below provides a brief analysis of the Minimally Affected Resources Common to Most Alternatives, which, accordingly, do not require further analysis in this EA. Those resources requiring a detailed analysis are so noted in Table 4-1 and that analysis is provided in Section 4.2.

Table 4-1: NEPA analysis approach

	Nutrient Reduction (Nonpoint Source)	Birds
Project Activities		
	Project activities would include construction of co-located hydrologic and stormwater system enhancements to directly address nutrient loading in Moss Point, MS (NR1), as well as implementation of conservation practices on farmland in Big Cedar Creek-West Pascagoula River watersheds (NR2). Project activities would occur in Jackson County, MS. NR1: Project would construct hydrologic and stormwater system enhancements at two locations to directly address nutrient loading in Moss Point, MS. First Street Stormwater Park: Activities would include constructing a variety of bioretention systems to slow stormwater and increase infiltration. Municipal stormwater infrastructure would be upgraded to direct water flow to the site. Trees, shrubs, seeded lawn and native grasses and perennials would also be planted as part of the nature-	Projects activities would benefit migratory birds and shorebirds injured by the DWH Oil Spill by improving and enhancing habitat conditions in the LMVR (Birds1) and on Cat Island (Birds2), and by providing predator management stewardship activities on mainland beaches (Birds3). Project activities would occur in Quitman, Humphries, Washington, Issaquena, Yazoo counties (Birds1), Harrison County (Birds2), and Hancock, Harrison and Jackson counties (Birds3). Birds1: Project activities would include some or all of the following: Heavy clearing (including mulching and chipping) to provide early successional emergent wetland habitat to establish herbaceous and woody control. Chemical treatment of unwanted vegetation Using large excavators and bulldozers for addition and replacement of water control structure construction, enhancement, widening, repair, replacement, and removal to form manageable impoundments which have positive drainage and function properly.

	Nutrient Reduction (Nonpoint Source)	Birds
	based solution approach to reduce nutrient pollution. Rain gardens and permeable pavement could be installed to promote infiltration. At the Khayat Park location, trees would be planted and a bioswale would be constructed to promote infiltration and reduce stormwater runoff. NR2: This project would focus on the enrollment of targeted tracts of agricultural and associated forested lands within the boundaries of four 12-digit HUC watersheds to reduce sediment and nutrient loading at the watershed level. USDA Conservation Practices are included here: Conservation Practice Standards Information | Natural Resources Conservation Service (usda.gov)[21]	Using large excavators and bulldozers to ensure wetland units function properly as intended, by removal of debris and grading. Enhancement of wildlife openings by use of conventional tractors, bush hoggs and disks. Supplement on-going moist-soil management with Japanese millet plantings for wintering waterfowl. Controlling unwanted vegetation by chemical treatment and conduct/supplement on-going moist-soil management. Implementation of water delivery systems, including installation of new wells to allow for annual flooding capabilities. Cleaning and sloping drainage ditches. Birds2: Project activities would include some or all of the following: Mechanical or hydraulic dredging of sand from an identified nearby source area and placement of the sediments on the northeastern portion of Cat Island, increasing the island footprint by up to approximately 100 acres. Dredging and placement would be conducted to depths and in quantities to be determined during Final Design and in accordance with a USACE Section 404 and Section 10 permit, a MDMR permit and MDEQ Water Quality Certification. Dredged material delivery to the placement site could be accomplished via a pipeline that is submerged, floating, or a combination. Heavy equipment would be utilized on land to direct the dredge sediments, build toe dikes, and spread and grade the materials to create beach and dune bird habitat. ATVs would be utilized for inspections and transportation. Planting of native species to stabilize the soils after placement of the dredged materials.

[21] https://www.nrcs.usda.gov/getting-assistance/conservation-practices

	Nutrient Reduction (Nonpoint Source)	Birds	
		Birds 3: Project activities would include some or all of the following: Development of a predator management strategy for the benefit of mainland Least Terns on the mainland beaches based on the predator management strategy that was developed under the DWH NRDA project, Dauphin Island West End Acquisition and implemented in another DWH NRDA Project, Stewardship of Coastal Alabama Beach Nesting Bird Habitat. Deterrent actions or habitat management actions that reduce predator use of the surrounding landscape would be used when aggressive methods are not feasible or desirable and for species that regularly prey on eggs or chicks but are rarely responsible for complete colony failure (e.g., Fish Crows, gulls, Gull-billed Terns). Specific actions might include pre-season aversion training using quail eggs injected with a distasteful but harmless chemical, perch removal or modification, and installation of wildlife-proof lids on trash cans located on the beach near colonies. More aggressive or costly actions such as lethal control, capture and translocation, or installation of mammal exclusion fences could be considered for predator species that regularly lead to complete colony failure, such as raccoons, foxes, coyotes, and Great Horned Owl. Methods chosen would be implemented across the coast in a design to maximize information gain about the relative effectiveness of each method. Data collected during follow-up monitoring would be used to inform a long-term predator management plan.	
Resources			
Geology and Substrates	Carried forward for detailed analysis.	Carried forward for detailed analysis.	**Physical Resources**
Hydrology, Water Quality, Wetlands and Floodplains	Carried forward for detailed analysis.	Carried forward for detailed analysis.	

	Nutrient Reduction (Nonpoint Source)	Birds	
Air Quality	There would be only negligible short-term adverse impacts associated with the implementation of the projects. Jackson and George counties are classified as in attainment, meaning criteria air pollutants do not exceed National Ambient Air Quality Standards (NAAQS). Project implementation could include equipment operation such as tractors, dozers, and all-terrain vehicles associated with earth moving, seeding, planting, habitat management, and small construction. Implementation of conservation practices would be limited in duration and scale and would have only negligible short-term adverse impacts on air quality. Whether activities occurred simultaneously or incrementally, the proposed alternatives would have no long-term adverse effects on air quality. Conservation practices on forested areas and reforestation activities would result in long-term beneficial effects on air quality resulting from more vigorous long-standing forested areas, which help to improve air quality.	There would be only negligible short-term adverse impacts associated with the implementation of the projects. Counties where the proposed alternative project areas are located are classified as in attainment (Quitman, Humphries, Washington, Issaquena, Yazoo, Hancock, Harrison and Jackson counties, MS), meaning criteria air pollutants do not exceed NAAQS. Project implementation could include equipment operation such as excavators, hydraulic or cutterhead dredges, tractors, dozers, and all-terrain vehicles associated with dredging, earth moving, seeding, planting, habitat management, small construction, and potential placement of cages or traps. Construction activities would be short-term and localized and therefore would have no long-term adverse effects on air quality.	

	Nutrient Reduction (Nonpoint Source)	Birds	
Noise	Nutrient Reduction restoration projects would be implemented on agricultural lands in rural areas (NR2) or on publicly owned municipal lands (NR1), including recreational parks, rights-of-way, etc. in suburban areas. These activities may result in short-term, minor, and localized noise effects that could provide annoyance to people or wildlife in the area during construction operations; however, the long-term character of the existing soundscape would remain the same. Any noise produced by the activities would not exceed normal farmstead noise or typical temporary construction noise in a suburban setting.	Short-term, minor and localized adverse noise effects may result from construction activities associated with the Birds restoration projects. Two of the projects would be located in remote locations (Birds1 and Birds2) so it is not likely that anyone would be affected by construction noise. Wildlife, fish, and birds are expected to move away from construction activities. The Birds3 project would be located on mainland beaches, but activities would be limited to development and implementation of a predator management strategy, including deterrent actions habitat management actions to reduce predator use of the surrounding landscape, none of which would result in significant noise effects.	
Habitats and Wildlife Species (including Birds)	Carried forward for detailed analysis.	Carried forward for detailed analysis.	**Biological Resources**
Marine and Estuarine Fauna (Fish, Shellfish, Benthic organisms) and Federally Managed Fisheries	There would be no short- or long-term, adverse effects to marine and estuarine resources or to essential fish habitat as a result of the implementation of the Nutrient Reduction alternatives because no activities would occur in marine or estuarine waters. Beneficial effects would result from reduced sediment and nutrient loading to coastal waters.	For the Birds1 and Birds3 alternatives, there are no reasonably foreseeable effects associated with the implementation of the projects because there would be no activities conducted in marine or estuarine waters. For the Birds restoration alternatives, only one project (Birds2) includes work in a marine or estuarine environment, and it was, therefore, carried forward for detailed analysis in Section 4.3.2.2.	
Protected Species	The MS TIG made a preliminary determination that there are no protected species in the project area and has shared resource information for protected species with USFWS.	Carried forward for detailed analysis.	

	Nutrient Reduction (Nonpoint Source)	Birds	
Economic Effects	Implementation of the projects may result in short-term, beneficial economic effects on local employment (NR1) and to private landowners who enroll in the program (NR2).	Implementation of the Birds1 and Birds2 projects may result in short-term, beneficial economic effects on local employment during project construction. No economic effects are expected from implementation of Birds3.	Socioeconomic Resources
Cultural Resources	Cultural resource evaluations have been initiated in accordance with all state and federal requirements to avoid potential adverse impacts; no project activities would be conducted until the consultations are complete. During project design, the Implementing Trustees will identify measures to avoid, minimize or mitigate any adverse impacts on historic properties located within the project areas. Resources that are eligible for the National Register of Historic Places would be avoided in the design of the projects, to the extent practicable. The projects would be implemented in accordance with all applicable laws and regulations concerning the protection of cultural and historic resources.	Cultural resource evaluations have been initiated in accordance with all state and federal requirements to avoid potential adverse impacts; no project activities would be conducted until the consultations are complete. During project design, the Implementing Trustees will identify measures to avoid, minimize or mitigate any adverse impacts on historic properties located within the project areas. Resources that are eligible for the National Register of Historic Places would be avoided in the design of the projects, to the extent practicable. The projects would be implemented in accordance with all applicable laws and regulations concerning the protection of cultural and historic resources.	
Infrastructure	Carried forward for detailed analysis.	There are no reasonably foreseeable effects associated with the implementation of the projects. None of the Birds Restoration alternatives evaluated in RP5/EA are anticipated to create increased demands on area infrastructure that could not be accommodated by existing or planned infrastructure or would affect traffic and transportation in the areas where projects are proposed.	
Aesthetics and Visual Resources	Carried forward for detailed analysis.	Carried forward for detailed analysis.	

	Nutrient Reduction (Nonpoint Source)	Birds	
Land and Marine Management	There are no reasonably foreseeable effects associated with the implementation of the projects.	There are no reasonably foreseeable effects associated with the implementation of the projects.	
Tourism and Recreation	No adverse effects are anticipated for the Nutrient Reduction projects. NR1 could provide recreational benefits because the Khayat Park Reforestation component of NR1 is located within a popular Moss Point City Park, which has numerous public amenities.	There could be short-term, minor, adverse impacts to tourism and recreation. Closures of public areas for construction/staging of equipment, placement of materials and barriers to protect public safety, and construction-related dust, could temporarily adversely affect visitors. Birds1 would provide long-term beneficial effects on tourism and recreation because the project would enhance habitat for migratory birds in multiple NWRs and WMAs in the LMRV, on public lands that are open for hunting and recreation. Beneficial effects could also be provided by Birds2 and Birds3, which are available to the public for passive recreational use.	
Fisheries and Aquaculture and Marine Transportation	For the Nutrient Reduction Restoration Type alternatives, there would be no adverse effect on fisheries and aquaculture or marine transportation. There would be no in-water work in marine waterways or estuarine habitats. Beneficial effects to fisheries and aquaculture resources would be provided by reduced sediment and nutrient loading to coastal waters.	Carried forward for detailed analysis.	
Public Health and Safety Including Flood and Shoreline Protection	None of the Nutrient Reduction activities would adversely affect public health and safety because construction areas would be temporarily restricted from public access, and there would be no long-term adverse impacts to public health and safety from the project. There would be beneficial effects to public health and safety by improving water quality in the watershed. There are no reasonably foreseeable adverse effects to shoreline protection associated with the	There are no reasonably foreseeable effects associated with the implementation of the projects. None of the Birds project activities would adversely affect public health and safety because construction areas would be temporarily restricted from public access.	

	Nutrient Reduction (Nonpoint Source)	Birds	
	implementation of the project. HEC-RAS models for NR1 indicate that the project would provide flood reduction benefits.		

4.2 ANALYSIS OF ALTERNATIVES

4.2.1 Nutrient Reduction

This section includes the following alternatives:

NR1 – Nutrient Reduction and Hydrologic Restoration in Moss Point, MS

NR2 – Big Cedar Creek – West Pascagoula River Nutrient Reduction

4.2.1.1 NR1 – Nutrient Reduction and Hydrologic Restoration in Moss Point, MS

Under this alternative, MDEQ would address nutrient loading in Moss Point, MS through the construction of a nature-based Stormwater Park adjacent to First Street and an urban reforestation activity in Khayat Park. The First Street Stormwater Park site would treat runoff from the drainage basin that flows into it. Stormwater would be intercepted and treated at the stormwater park and slowly released in order to reduce nutrient pollution in adjacent coastal streams that lead to the Mississippi Sound. As the design is informed by survey data, additional design work would be carried out to increase storage capacity to the maximum extent possible (estimated at 364,000 C.F.). Riser pipes would be sized to facilitate stormwater retention/treatment for prolonged durations.

The First Street Stormwater Park would be designed with adequate capacity to handle relatively frequent storm events (e.g., 1-to-3-year storm events). This design would include upgrading stormwater infrastructure to direct water flow to the stormwater park. Within the park, the design would include a variety of bioretention systems to slow stormwater and increase infiltration throughout the park. In addition to the naturalized detention landscape designed to temporarily hold and filter runoff, the park would also contain above ground nature-based solution (NbS) installations such as rain gardens to promote infiltration.

The 10-acre urban reforestation effort at Khayat Park would increase water infiltration and evapotranspiration in the project area prior to stormwater entering coastal streams that drain to the Mississippi Sound. Native vegetation would be planted in the area including a mixture of small, medium, and large trees as well as native shrubs. Additionally, the project would construct a bioswale in Khayat Park that would filter stormwater and promote native wetland plants.

4.2.1.1.1 Physical Resources: Geology and Substrates – Affected Environment

The project area is located within the Gulf Coastal Plain of southern Mississippi, where surface geology consists of unconsolidated Quaternary sediments (primarily sands, silts, and clays) overlying older Tertiary formations such as the Pascagoula and Hattiesburg Formations. Soils in Moss Point are generally poorly drained loams and clays typical of low-lying coastal terraces. These substrates reflect long-term fluvial and coastal deposition processes characteristic of the lower Pascagoula River basin.

4.2.1.1.2 Physical Resources: Geology and Substrates – Environmental Consequences

Minor, long-term adverse effects to soils are anticipated as a result of ground-disturbing construction activities to create the stormwater infrastructure for the Stormwater Park, including excavation of a new detention pond(s) and installation of rain gardens, in addition to construction of a bioswale in the Khayat Park Reforestation area. There would be long-term benefits to soils from the planting of vegetation which would reduce soil erosion. Site design of the stormwater park may also include soil replacement, especially in deeper areas.

4.2.1.1.3 Physical Resources: Hydrology, Water Quality, Wetlands, and Floodplains – Affected Environment

Section 3.3.2 of the PDARP/PEIS addresses river flows on the Northern Gulf geography and water quality. Section 6.14.2 discusses future sea level rise, storm surge and storm intensity projections and is incorporated by reference here.

4.2.1.1.3.1 *Physical Resources: Hydrology and Water Quality.*

Moss Point lies within the Pascagoula River and Escatawpa River watersheds, where drainage is conveyed by a network of urban ditches, culverts, and small tributaries that discharge to the Mississippi Sound. The city's stormwater system in Moss Point is known to have capacity constraints and aging components, which regularly contribute to localized flooding and overflows.[22]

The First Street Stormwater Park project area drains through urban ditches and storm drains into the Escatawpa River by way of Rhodes Bayou, and the Khayat Park project area drains directly into Bayou Casotte.

4.2.1.1.3.2 *Physical Resources: Wetlands.*

Portions of both project sites exhibit evidence of seasonal inundation and hydrophytic vegetation, suggesting the potential presence of wetlands. Additionally, a segment of Bayou

[22] https://gomesa.dmr.ms.gov/gomesaapps/details?id=1060

Cassotte, mapped as riverine wetlands according to the U.S. Fish and Wildlife Service (USFWS) National Wetlands Inventory, crosses the Khayat Park site.

4.2.1.1.3.3 *Physical Resources: Floodplains.*

Based on the FEMA National Flood Hazard Layer Viewer, approximately 52% of the First Street Stormwater Park component area is located within the 0.2% annual chance flood hazard (Zone X), and approximately 33% of the Khayat Park Reforestation project component area is located within the Zone X and Zone A (Special Flood Hazard Area with a 1.0% annual chance flooding, no base flood elevation determination).

4.2.1.1.4 Physical Resources: Hydrology, Water Quality, Wetlands, and Floodplains – Environmental Consequences

4.2.1.1.4.1 *Physical Resources: Hydrology and Water Quality.*

The project would provide long-term benefits to hydrology and water quality by intercepting and treating stormwater in a drainage basin and slowly releasing it, resulting in a reduction of nutrient pollution in adjacent coastal streams that lead to the Mississippi Sound. Riser pipes would be sized to facilitate stormwater retention/treatment for prolonged durations.

Site design of the stormwater park may also include soil replacement, especially in deeper areas, with an engineered soil mix (sand, topsoil, and peat) to get better infiltration rates and nutrient and other contaminant removal. In addition, the planting plan incorporates species with high evapotranspiration rates (e.g., slash pine (*Pinus elliotti*)) to facilitate basin drawdown and further enhance stormwater management in the stormwater park site. Reforestation would also provide long-term benefits to hydrology and water quality by reducing overland flow and sediment runoff and increasing infiltration and evapotranspiration. The use of green infrastructure such as rain gardens, bioswales, and permeable pavements would reduce flood risk while improving water quality.

4.2.1.1.4.2 *Physical Resources: Wetlands.*

There could be short-term, minor adverse effects on wetlands, if present, due to soil disturbance during construction. BMPs would be in place to minimize any wetlands impacts. The Implementing Trustee would obtain required state and federal permits prior to any construction in jurisdictional wetlands.

There would be long-term, beneficial effects on wetlands due to increased wetland acreage from the creation of the detention basin.

4.2.1.1.4.3 *Physical Resources: Floodplains.*

There would be beneficial effects on floodplains because the stormwater park would promote infiltration, recharge groundwater in the surficial aquifer, restore wetland areas and ponds, and increase storage capacity of storm water during flood events. The use of green infrastructure such as rain gardens, bioswales, and permeable pavements would reduce flood risk while improving water quality.

4.2.1.1.5 Physical Resources: Air Quality – Affected Environment

The project activities would occur in Jackson County, which is classified by MDEQ as in attainment, meaning criteria air pollutants do not exceed National Ambient Air Quality Standards (NAAQS).

4.2.1.1.6 Physical Resources: Air Quality – Environmental Consequences

See Table 4-1.

4.2.1.1.7 Physical Resources: Noise – Affected Environment

The project areas consist of upland parcels (one of which is a park) owned by the City of Moss Point, in an urban environment. Surrounding land uses are primarily residential and institutional traffic noise and other normal anthropogenic noise are present in the project area.

4.2.1.1.8 Physical Resources: Noise – Environmental Consequences

See Table 4-1.

4.2.1.1.9 Biological Resources: Habitats and Wildlife (Including Birds) – Affected Environment

The project sites are characterized by maintained lawns, scattered ornamental trees, and one paved surface, providing limited wildlife habitat. Common fauna include urban-adapted species such as gray squirrels (*Sciurus carolinensis*), raccoons, and resident songbirds typical of suburban areas. Native vegetation remnants are sparse and primarily limited to small clusters of mixed hardwoods along drainageways.

4.2.1.1.10 Biological Resources: Habitats and Wildlife (Including Birds) – Environmental Consequences

There would be short-term, minor adverse impacts to habitats and wildlife during construction, from the use of heavy equipment and because of soil disturbance. There would be long-term benefits to habitats and wildlife from replanting native trees, shrubs, and groundcovers, which stabilize the soil and increase biodiversity, providing vital habitats for a wide variety of wildlife, including birds, amphibians, and minnows.

4.2.1.1.11 Biological Resources: Marine and Estuarine Fauna (Fish, Shellfish, Benthic organisms) and Federally Managed Fisheries – Affected Environment

The project areas consist of upland parcels owned by the City of Moss Point, in an urban environment. There would be no project activities in marine or estuarine waters.

4.2.1.1.12 Biological Resources: Marine and Estuarine Fauna (Fish, Shellfish, Benthic organisms) and Federally Managed Fisheries – Environmental Consequences

See Table 4-1.

4.2.1.1.13 Biological Resources: Protected Species – Affected Environment

A number of species listed as endangered or threatened under the Endangered Species Act (ESA) occur in coastal Mississippi. Federally listed species, with potential to occur in the project vicinity include the eastern black rail *(Laterallus jamaicensis*), piping plover (*Charadrius melodus*), rufa red knot (*Calidris canutus rufa*), Alabama red-bellied turtle (*Pseudemys alabamensis*), black pinesnake (*Pituophis melanoleucus lodingi*), eastern indigo snake (*Drymarchon couperi*), and gopher tortoise (*Gopherus polyphemus*). However, habitat within the urban project area is highly disturbed and lacks the specialized features required by these species, and no designated critical habitat overlaps the project sites. Bald eagles (*Haliaeetus leucocephalus*), which are protected under the Bald and Golden Eagle Protection Act, could occur in the area.

4.2.1.1.14 Biological Resources: Protected Species –Environmental Consequences.

See Table 4-1.

4.2.1.1.15 Socioeconomic Resources: Economic Effects – Affected Environment

The median household income in the City of Moss Point is $46,684, which is lower than the median household income in Mississippi ($59,127). The poverty rate in Moss Point is 17.8%, which is the same poverty rate as the state of Mississippi.[23]

4.2.1.1.16 Socioeconomic: Economic Effects - Environmental Consequences.

See Table 4-1.

4.2.1.1.17 Socioeconomic Resources: Cultural Resources – Affected Environment

The two project locations considered under this alternative are over one mile from the designated Historic District. A review of the MDAH Historic Resources Inventory Map did not identify recorded archaeological sites or designated historic properties directly within these footprints.

4.2.1.1.18 Socioeconomic Resources: Cultural Resources – Environmental Consequences.

See Table 4-1.

4.2.1.1.19 Socioeconomic Resources: Infrastructure – Affected Environment

Existing infrastructure in the project vicinity includes municipal stormwater conveyance systems, local roadways, and park amenities. Surrounding land uses are primarily residential and institutional, supported by existing water and sewer utilities.

---

[23] Moss Point city, Mississippi - Census Bureau Profile

4.2.1.1.20 Socioeconomic Resources: Infrastructure – Environmental Consequences

This project would have a long-term beneficial effect on stormwater infrastructure by directing stormwater to the stormwater park where a variety of bioretention systems would slow stormwater and increase infiltration throughout the park, reducing nutrient pollution. The stormwater park would be designed with adequate capacity to handle relatively common storm events (e.g., 1-to-3-year storm events).

4.2.1.1.21 Socioeconomic Resources: Aesthetics and Visual Resources – Affected Environment

The visual environment consists of urban and suburban features such as paved surfaces, maintained lawns, mature trees, and utility corridors within a residential and institutional setting. Neither project site is located within a designated scenic corridor or visually sensitive area, and surrounding views are characteristic of developed city neighborhoods.

4.2.1.1.22 Socioeconomic Resources: Aesthetics and Visual Resources – Environmental Consequences

There would be no adverse effect on aesthetics and visual resources. There would be long-term benefits to these resources as the project areas would be improved with naturalized detention landscape, reforestation, rain gardens, permeable pavement, and native vegetation plantings, resulting in an aesthetically pleasing passive recreation park-like setting.

4.2.1.1.23 Socioeconomic Resources: Land and Marine Management – Affected Environment

The project areas consist of upland parcels (one of which is a park) in an urban environment in the City of Moss Point.

4.2.1.1.24 Socioeconomic Resources: Land and Marine Management – Environmental Consequences

See Table 4-1.

4.2.1.1.25 Socioeconomic Resources: Tourism and Recreation – Affected Environment

The project areas consist of upland parcels owned by the City of Moss Point. The Khayat Park Reforestation component is located within Khayat Park, a spacious public park with five pavilions, grills, outdoor amphitheater, play area, splash pad, basketball court, and walking track.

4.2.1.1.26 Socioeconomic Resources: Tourism and Recreation – Environmental Consequences.

See Table 4-1.

4.2.1.1.27 Socioeconomic Resources: Fisheries and Aquaculture and Marine Transportation Affected Environment

The project areas consist of upland parcels (one of which is a park) in Moss Point, an urban environment; there are no fisheries or aquaculture operations or marine transportation in the project areas.

4.2.1.1.28 Socioeconomic Resources: Fisheries and Aquaculture and Marine Transportation – Environmental Consequences.

See Table 4-1.

4.2.1.1.29 Socioeconomic Resources: Public Health and Safety Including Flood and Shoreline Protection – Affected Environment

The project areas consist of upland parcels, portions of which are located within a floodplain. The majority of the project area is located outside of the floodplain. Based on the FEMA National Flood Hazard Layer Viewer, approximately 52% of the First Street Stormwater Park component area is located within Zone X, and approximately 33% of the Khayat Park Reforestation project component area is located within the Zone X and Zone A.

4.2.1.1.30 Socioeconomic Resources: Public Health and Safety Including Flood and Shoreline Protection – Environmental Consequences

See Table 4-1.

4.2.1.2 NR2 – Big Cedar Creek – West Pascagoula River Nutrient Reduction

The NR2-Big Cedar Creek-West Pascagoula Creek Nutrient Reduction Alternative proposed in this RP5/EA, was also analyzed in its entirety in MS TIG RP1/EA,[24] and considered again in MS TIG RP4/RP2/EA.[25] Those analyses are incorporated by reference here in accordance with DOI NEPA Procedures[26] (Section 3). Incorporation by reference and tiering provide opportunities to reduce paperwork, shorten the length of an environmental document, and avoid redundant analysis in the NEPA process. Incorporation by reference refers to other available documents that cover similar issues, effects, or resources considered in the NEPA analysis. Incorporation by reference allows federal agencies to briefly summarize the relevant portions of these other documents rather than repeat them. When tiering, federal agencies rely on and incorporate by reference discussions of general matters in broader EISs or EAs that apply to subsequent narrower circumstances. Federal agencies may incorporate material, such as planning studies, analyses, or other relevant information, into

[24] MS TIG 2017. 2016-2017 Restoration Plan and Environmental Assessment; Restoration of Wetlands, Coastal, and Nearshore Habitats; Birds, and Nutrient Reduction (MS TIG RP1/EA)

[25] MS TIG 2024. Final Restoration Plan and Environmental Assessment: Restoration of Wetlands, Coastal, and Nearshore Habitats; Nutrient Reduction (Nonpoint Source); and Provide and Enhance Recreational Opportunities.

[26] DOI NEPA Procedures, Appendix 1 Implementation Guidance to Bureaus, at 35-36. r.

environmental documents by reference when the effect will be to reduce the length of an environmental document without impeding federal agency and public review of the action.

As discussed in MS TIG RP1/EA and MS TIG RP4/EA, NR2-Big Cedar Creek – West Pascagoula Creek would focus on the enrollment of targeted tracts of agricultural and associated forested lands within the boundaries of four 12-digit HUC watersheds to reduce sediment and nutrient loading at the watershed level. These practices are similar in scope to those identified and evaluated in MS TIG RP1/EA and would not exceed the adverse impact thresholds identified in that plan and summarized below. Site-specific planning would be conducted to determine which particular practices are appropriate to use. For further project details, see Section 2.4.2.3 of MS TIG RP4/EA.

MS TIG RP1/EA provided an analysis of six exemplar practices (Table 3.9-2) which represent the broader suite of over 50 practices that could be implemented for alternatives in that plan (MS TIG RP1/EA Appendix A). The suite of practices contemplated for the NR3-Big Cedar Creek-West Pascagoula River Nutrient Reduction Alternative in MS TIG RP4/EA would be the same as NR2 Big Cedar Creek-West Pascagoula River Nutrient Reduction Alternative in MS TIG RP5/EA. MS TIG RP1/EA included an analysis of 13 impact topics related to conservation practices (Section 3.9.1 pages 177-217) which is summarized in Section 4.2.5.2 of MS RP4/EA and are hereby incorporated by reference for the NR2-Big Cedar Creek-West Pascagoula River Nutrient Reduction Alternative. That plan, referencing MS RP1/EA, included the following impacts analysis summary which are applicable in this RP5/EA:

- Short-term, minor to moderate, adverse impacts to geology and substrates during implementation of conservations practices, with long-term beneficial impacts
- Short-term, minor, adverse impacts to water quality due to construction activities or implementation of conservation practices, with long-term beneficial impacts
- Short-term minor to moderate, adverse impacts to habitats and wildlife from soil disturbing activities, with long-term beneficial impacts
- No adverse impacts to socioeconomic resource categories including effects on the Quality of Life of the American People

For site-specific conservation practices, potential effects to historic properties would be considered when the undertaking is the type of activity that has the potential to cause effects on these resources. Resources that are eligible for the National Register of Historic Places would be avoided in the design of the conservation practices, to the extent practicable, as required by state or federal law.

Overall, the project would not have impacts to any of the resource categories that exceed the PDARP/PEIS definition of short-term, minor to moderate, and adverse.

4.2.1.3 Nutrient Reduction - No Action Alternative

4.2.1.4 Environmental Consequences Summary

In addition to the proposed alternatives previously discussed for the NR (Nonpoint Source) Restoration Type, the MS TIG evaluated the No Action Alternative as a benchmark and basis for comparison of potential environmental consequences with the action alternatives.

The No Action Alternative would have no beneficial impacts to water quality through nutrient reduction because this alternative would largely result in a continuation of the conditions described in the PDARP/PEIS Chapter 3, Ecosystem Setting and Chapter 4, Injury to Natural Resources, and there would be no associated benefits to water quality by the reduction of sediments and nutrient loading. Furthermore, long-term, minor, adverse impacts to coastal watersheds, including water quality and habitats, would continue to occur from non-point source pollution under the No Action Alternative. The full suite of restoration benefits would not be realized solely with natural processes and without the benefit of leveraged funding opportunities and opportunity for robust monitoring and adaptive management. The No Action Alternative does not meet the MS TIG's goals and objectives and clearly does not provide the significant restoration benefit to water quality through nutrient reduction that is anticipated to occur through the action alternatives.

4.2.2 Birds

This section includes the following alternatives:

Birds1 - Lower Mississippi River Valley Migratory Bird Habitat Enhancement
Birds2 - Restoration of Shorebird Habitat on Cat Island, MS
Birds3 - Increased Nesting Success through Predator Management on Mainland Beaches
Birds - No Action

4.2.2.1  Birds1 – Lower Mississippi River Valley Migratory Bird Habitat Enhancement

Under this alternative, MDEQ and DOI would enhance and actively manage wetland management units in multiple NWRs and WMAs in the LMRV. Restoration activities are proposed at multiple sites to restore/improve habitat conditions to benefit multiple species of migratory birds affected by the 2010 DWH oil spill. The primary objective is to ensure that adequate shallow-water habitat is maximized within the project areas to meet or exceed the foraging requirements of shorebirds, wading birds, and waterfowl during their migration to and from the Gulf. Seven NWRs and WMAs have been identified for this project, portions of some of which were previously restored through a NFWF-GEBF project funded through MDEQ in 2020:

Holt Collier NWR, Washington County, MS (125 acres)
Howard Miller WMA, Issaquena County, MS (1,000 acres)
Mahannah WMA, Issaquena County, MS (500 acres)
Muscadine Farms WMA, Washington County, MS (500 acres)

O'Keefe WMA, Quitman County, MS (30 acres)
Panther Swamp NWR, Yazoo County, MS (250 acres)
Sky Lake WMA, Humphreys County, MS (139 acres)

Project activities could include some or all of the following:

- Heavy clearing (including mulching and chipping) to provide early successional emergent wetland habitat to establish herbaceous and woody control
- Chemical treatment of unwanted vegetation
- Using large excavators and bulldozers for addition and replacement of water control structure construction, enhancement, widening, repair, replacement, and removal to form manageable impoundments which have positive drainage and function properly
- Using large excavators and bulldozers to ensure wetland units function properly as intended, by removal of debris and grading
- Enhancement of wildlife openings by use of conventional tractors, bush hoggs, and disks
- Supplement on-going moist-soil management with Japanese millet plantings for wintering waterfowl
- Controlling unwanted vegetation by chemical treatment and conduct/supplement on-going moist-soil management
- Implementation of water delivery systems, including installation of new wells to allow for annual flooding capabilities
- Cleaning and sloping drainage ditches

4.2.2.1.1 Physical Resources: Geology and Substrates – Affected Environment

The project sites occur within the Mississippi River Alluvial Plain, a broad low-gradient floodplain formed by historic meandering and overbank deposition of the Mississippi River and its distributaries. Surficial deposits consist primarily of Quaternary alluvium (unconsolidated sands, silts, and clays) underlain by Pleistocene terrace and loess deposits. Soils in this region commonly have hydric or poorly drained characteristics, fine textures (clays and silty clays), and low natural permeability.

4.2.2.1.2 Physical Resources: Geology and Substrates – Environmental Consequences

Minor, long-term adverse effects to soils are anticipated as a result of ground-disturbing construction activities including levee construction, enhancement, widening, repair, and removal to form manageable impoundment, addition and replacement of water control structures, implementation of water delivery systems, including installation of new wells to allow for annual flooding capabilities, cleaning and sloping drainage ditches, and heavy clearing in some of the impoundments to provide early successional emergent wetland habitat.

4.2.2.1.3 Physical Resources Hydrology, Water Quality, Wetlands, and Floodplains – Affected Environment Physical Resources: Hydrology.

All project sites are located within the LMRV hydrologic system, where local hydrology is shaped by river backwaters, oxbows, and managed impoundments. Each refuge and WMA contains extensive levee and ditch systems to regulate water levels and maintain shallow-flooded habitats. At Holt Collier NWR, several moist-soil impoundments simulate natural flood regimes. Panther Swamp NWR relies on interior ditches and the Yazoo Backwater for hydrologic connectivity. Howard Miller, Mahannah, Muscadine Farms, and O'Keefe WMAs use water-control structures, wells, and pumps for seasonal flooding, while Sky Lake WMA includes natural hydrologic exchange through oxbow channels and swamp depressions.

4.2.2.1.3.1 *Physical Resources: Water Quality.*

Refuge and WMA management documents note that water delivered into impoundments often carries sediment, nutrients, and agricultural runoff from adjacent lands. All seven project sites lie within the Yazoo River Basin. Agricultural runoff and eroded soils contribute to elevated turbidity, nutrients, and residual organic pollutant burdens within refuge and WMA waters.

4.2.2.1.3.2 *Physical Resources: Wetlands.*

Wetlands are the dominant land cover within all seven project areas and include bottomland hardwood forest, scrub-shrub wetlands, and emergent marsh. Managed moist-soil impoundments at Howard Miller, Mahannah, Muscadine Farms, and O'Keefe WMAs provide critical foraging and loafing habitat for waterfowl. Panther Swamp and Holt Collier refuges contain cypress-tupelo swamps, reforested bottomlands, and managed waterfowl units. Sky Lake WMA protects one of the region's largest stands of ancient bald cypress trees and associated floodplain wetlands.

The project sites occur within managed wetland and waterfowl management units situated in a broader Lower Mississippi River Valley landscape of bottomland hardwood forest, cypress-tupelo swamp, moist-soil wetlands, managed impoundments, and seasonally flooded agricultural fields. These areas are actively or historically managed to support migratory waterfowl and other wetland-dependent birds through a combination of water-level management (levees, water control structures, seasonal flooding and drawdown) and vegetation management (moist-soil units, planted crops, and reforestation). Habitat conditions vary by site and season, ranging from intensively managed moist-soil and agricultural impoundments to more natural forested wetland systems.

4.2.2.1.3.3 *Physical Resources: Floodplains.*

Each site lies within the active floodplain of the Mississippi River or its backwater tributaries and is mapped within FEMA Flood Zones A or AE. Seasonal inundation and overbank flooding are essential for nutrient exchange and habitat renewal.

4.2.2.1.4 Physical Resources: Hydrology, Water Quality, Wetlands, and Floodplains – Environmental Consequences

4.2.2.1.4.1 *Physical Resources: Hydrology.*

Levee systems and controlled impoundments would modify hydrologic connectivity, resulting in long-term, minor, adverse effects on hydrology.

4.2.2.1.4.2 *Physical Resources: Water Quality.*

There would be short-term, minor, adverse impacts to water quality from disturbance of sediments associated with construction activities including creation of manageable impoundments, cleaning and sloping drainage ditches, and heavy clearing in some of the impoundments. The managed impoundments and wetland units in these sites would provide long-term beneficial effects by serving partial buffering and treatment roles through sediment trapping and nutrient uptake by wetland vegetation.

4.2.2.1.4.3 *Physical Resources: Wetlands.*

During construction, there could be short-term, minor, adverse effects from sediment movement that could temporarily adversely impact wetlands. Construction BMPs would be implemented to control sediment transport. Wetlands delineations would be conducted on the project areas. The Implementing Trustee would obtain required state and federal permits prior to any construction in jurisdictional wetlands. Overall, there would be long-term, net beneficial effects on wetlands through the creation of moist soil wetlands and agriculture wetlands with the ability to drain properly in multiple project areas in the LMRV. There would be no conversion of wetlands.

4.2.2.1.4.4 *Physical Resources: Floodplains.*

Due to the scale of the project, and the minimal fill involved, there would be no significant adverse impact to floodplains. NWRs and WMAs would retain significant floodplain function and continue to provide water-storage and sediment-trapping capacity.

4.2.2.1.5 Physical Resources: Air Quality Affected Environment

The project activities would occur in Washington County, Issaquena County, Quitman County, Yazoo County, and Humphreys County, MS, all of which are classified by MDEQ as in attainment, meaning criteria air pollutants do not exceed NAAQS.

4.2.2.1.6 Physical Resources: Air Quality – Environmental Consequences

See Table 4-1.

4.2.2.1.7 Physical Resources: Noise – Affected Environment

The project sites occur within managed wetland and waterfowl management units in multiple NWRs and WMAs situated in a broader LMRV landscape of bottomland hardwood forest, cypress-tupelo swamp, moist-soil wetlands, managed impoundments, and seasonally flooded agricultural fields. As these are located in rural areas with few roads, and there are few structures or homes in these management areas, the ambient noise level is low.

4.2.2.1.8 Physical Resources: Noise – Environmental Consequences

See Table 4-1.

4.2.2.1.9 Biological Resources: Habitats and Wildlife (Including Birds) – Affected Environment

Across all seven locations, habitat consists of a mosaic of bottomland hardwood forest, cypress-tupelo swamp, and managed moist-soil units that support diverse assemblages of migratory and resident wildlife. The refuges and WMAs provide critical foraging and roosting areas for dabbling ducks, wading birds, shorebirds, and forest mammal and amphibian species.

Holt Collier NWR: Bottomland hardwoods, shallow impoundments, and sloughs supporting waterfowl, shorebirds, and neotropical migrants.

Panther Swamp NWR: Large tracts of cypress-gum swamp, marsh, and reforested wetland supporting wood ducks, egrets, and herons.

Howard Miller, Mahannah, O'Keefe, and Muscadine Farms WMAs: Managed impoundments for waterfowl production and wintering; maintained moist-soil vegetation such as smartweed, millet, and sedges.

Sky Lake WMA: Bald cypress swamp and backwater wetlands supporting wading birds, amphibians, and aquatic mammals.

4.2.2.1.10 Biological Resources: Habitats and Wildlife (Including Birds) – Environmental Consequences

There could be short-term, localized, minor, adverse impacts to wildlife during construction including elevated noise levels from construction and ground-disturbing activities. Affected species are mobile and would likely leave the area during construction. Pre-construction nesting surveys for migratory birds and raptors on adjacent land would be conducted, if required, and if evidence of nesting is found, coordination with the USFWS would be initiated to develop and implement appropriate conservation measures. Overall, the project would have beneficial effects on habitats and wildlife (especially birds). There would be no conversion of habitat types, only enhancements.

4.2.2.1.11 Biological Resources: Marine and Estuarine Fauna – Affected Environment

This project does not include any activities in marine or estuarine waters.

4.2.2.1.12 Biological Resources: Marine and Estuarine Fauna – Environmental Consequences

See Table 4-1.

4.2.2.1.13 Biological Resources: Protected Species – Affected Environment

Federally listed species that may occur within the seven project areas include the northern long-eared bat (NLEB) (*Myotis septentrionalis*) and pondberry (*Lindera melissifolia*). The bald eagle occurs throughout the LMRV and is protected under the Bald and Golden Eagle Protection Act. None of the sites overlap designated critical habitat.

4.2.2.1.14 Biological Resources: Protected Species – Environmental Consequences

NLEB- A portion of the project area (Mahanna WMA) occurs within the NLEB Hibernating Range and the NLEB Year Round Active Zone 1, but the species is unlikely to be present because the project area does not contain suitable summer/year-round active season habitat which consists of a wide variety of forested/wooded habitats where they roost, forage, and travel. They are predominantly found in forest/wooded habitat except when/if hibernating. Additionally, project activities are not anticipated to impact NLEB because the project area does not include any known or potential NLEB hibernacula (caves and their associated sinkholes, fissures other karst features, or anthropogenic features such as abandoned mines and tunnels), is not within 0.25 mile of a bridge or culvert that is known to be occupied by NLEB, and does not include any atypical hibernacula (talus, rock shelters, or rock crevices within cliff or rock faces). Project activities would not include tree removal within 0.5 mile of a hibernaculum, and clearing of trees greater than 3-inch diameter at breast height will occur outside the pup (May 1-July 15) and torpor seasons (December 15 – February 15).

Pondberry – Pondberry may be, but is not likely to be, located in the project area. Identified colonies in Mississippi are located in Sharkey County (Delta National Forest), Bolivar County, and Sunflower County. According to habitat documentation, there are approximately 194 extant pondberry colonies in Mississippi, with about 182 in the Delta National Forest. Project activities are not expected to adversely affect pondberry because it would be avoided to the extent practicable by conducting surveys during engineering and design in project areas where there is potential suitable habitat.

Based on this analysis, project activities are not expected to have adverse impacts on either NLEB or pondberry.

4.2.2.1.15 Socioeconomic Resources: Economic Effects – Affected Environment

Holt Collier NWR, Washington County, MS

- The employment rate in Census Tract 1 of Washington County is 65.8%, which is higher than that for the state of Mississippi (55.7%). The predominant employment sector is local, state, and federal government workers (18.4%). The median household income is $63,259, which is higher than the median income in Mississippi ($59,127). The poverty rate is 12.1%, which is lower than the poverty rate of the state of Mississippi (17.8%).[27]

Howard Miller WMA and Mahannah WMA, Issaquena County, MS

- The employment rate in Census Tract 9501 of Issaquena County is 17.1%, which is lower than that for the state of Mississippi (55.7%). The largest employment sector is local, state, and federal government workers (12.2%).

[27] Washington County, MS - Census Bureau Profile

The median household income is $29,271, which is lower than the median income in Mississippi ($59,127). The poverty rate is 17.2%, which is lower than the poverty rate of the state of Mississippi (17.8%).[28]

Muscadine Farms WMA, Washington County, MS

- The employment rate in Census Tract 15 of Washington County is 55.4%, which is slightly lower than that for the state of Mississippi (55.7%). The predominant employment sector is local, state, and federal government workers (17.5%). The median household income in is $53,882, which is lower than the median income in Mississippi ($59,127). The poverty rate is 16.2%, which is lower than the poverty rate of the state of Mississippi (17.8%).[29]

O'Keefe WMA, Quitman County, MS

- The employment rate in Census Tract 9503 of Quitman County is 46%, which is lower than that for the state of Mississippi (55.7%). The predominant employment sector is local, state, and federal government workers (41.5%). The median household income is $38,182, which is lower than the median income in Mississippi ($59,127). The poverty rate is 39.1%, which is higher than the poverty rate of the state of Mississippi (17.8%).[30]

Panther Swamp NWR, Yazoo County, MS

- There was no employment, income or poverty data available for Census Tract 9504 of Yazoo County.[31]

Sky Lake WMA, Humphreys County, MS

- The employment rate in Census Tract 9501 of Humphreys County is 45.2%, which is lower than that for the state of Mississippi (55.7%). The predominant employment sector is local, state, and federal government workers (30%). The median household is $28,750, which is lower than the median income in Mississippi ($59,127). The poverty rate is 24.9%, which is higher than the poverty rate of the state of Mississippi (17.8%).[32]

4.2.2.1.16 Socioeconomic Resources: Economic Effects – Environmental Consequences

See Table 4-1.

---

[28] Issaquena County, MS – Census Bureau Profile

[29] Washington County, MS – Census Bureau Profile

[30] Quitman County, MS – Census Bureau Profile

[31] Yazoo County, MS – Census Bureau Profile

[32] Humphreys County, MS – Census Bureau Profile

4.2.2.1.17 Socioeconomic Resources: Cultural Resources – Affected Environment

The project areas have histories of agricultural conversion, levee construction, and habitat management within the greater Yazoo Backwater and Delta regions. Much of the land has been previously disturbed for farming and hydrologic infrastructure. Existing refuge and WMA records indicate no known archaeological sites or listed historic properties within the active management units proposed for enhancement. Additionally, a review of the MDAH Historic Resources Inventory Map did not identify recorded archaeological sites or designated historic properties within the footprints of the project areas.

4.2.2.1.18 Socioeconomic Resources: Cultural Resources – Environmental Consequences

See Table 4-1.

4.2.2.1.19 Socioeconomic Resources: Infrastructure – Affected Environment

The project areas are located within NWRs and WMAs in the Yazoo Backwater and Delta regions which generally have only basic infrastructure since their goal is to protect and restore wildlife habitat. Infrastructure typically includes access roads, trails and limited parking areas, hunter information/education and visitor centers, and administrative support structures for staff, and may also include amenities such as camping areas and boat ramps.

4.2.2.1.20 Socioeconomic Resources: Infrastructure – Environmental Consequences

See Table 4-1.

4.2.2.1.21 Socioeconomic Resources: Land and Marine Management– Affected Environment

The project areas are wetland management units in multiple NWRs and WMAs in the LMRV. These areas have histories of agricultural conversion, levee construction, and habitat management; much of the land has been previously disturbed for farming and hydrologic infrastructure. Habitat management activities include construction of water-control structures, terrace levees, diesel pumps and water distribution systems for managing water levels in moist-soil units and flooded timber habitats as well as cleaning and sloping drainage ditches, chemical treatment of unwanted vegetation, enhancement of wildlife openings by use of conventional tractors, bush hoggs and disks, using large excavators and bulldozers to ensure wetland units function properly as intended by removal of debris and grading, and supplementing on-going moist-soil management with Japanese millet plantings for wintering waterfowl, among others.

The project areas do not include marine habitat.

4.2.2.1.22 Socioeconomic Resources: Land and Marine Management – Environmental Consequences

See Table 4-1.

4.2.2.1.23 Socioeconomic Resources: Tourism and Recreation – Affected Environment

The seven NWRs and WMAs that have been identified for this project include Holt Collier NWR, Washington County; Howard Miller WMA, Issaquena County; Mahannah WMA, Issaquena County; Muscadine Farms WMA, Washington County; O'Keefe WMA, Quitman County; Panther Swamp NWR, Yazoo County; and Sky Lake WMA, Humphreys County. They provide recreational opportunities for hiking, hunting, wildlife viewing, and boating.

4.2.2.1.24 Socioeconomic Resources: Tourism and Recreation – Environmental Consequences

See Table 4-1.

4.2.2.1.25 Socioeconomic Resources: Fisheries and Aquaculture and Marine Transportation – Affected Environment

The project sites are located within inland floodplain wetlands and managed impoundments of the LMRV, well removed from navigable marine waterways. No aquaculture operations occur within or adjacent to any of the NWRs or WMAs, and project activities are not expected to affect commercial or recreational fisheries. The project areas are also outside of designated navigation channels or port facilities; therefore, no marine transportation infrastructure or operations would be affected.

4.2.2.1.26 Socioeconomic Resources: Fisheries and Aquaculture and Marine Transportation – Environmental Consequences

The project would have no effect on fisheries and aquaculture or on marine transportation.

4.2.2.1.27 Socioeconomic Resources: Aesthetics and Visual Resources – Affected Environment

The visual setting across the project sites is defined by expansive wetland landscapes, bottomland forest, and open water interspersed with levees and managed impoundments. These areas offer high scenic value, particularly during waterfowl season, and are valued for wildlife observation and recreation. Managed impoundments and forested floodplain mosaics provide the dominant visual character of the region.

4.2.2.1.28 Socioeconomic Resources: Aesthetics and Visual Resources – Environmental Consequences

There would be short-term, minor adverse impacts during construction due to the visual obstructions of construction equipment and upturned soil. After construction, the project would have long-term beneficial effects on the visual setting (expansive wetland landscapes, bottomland forest, and open water interspersed with levees and managed impoundments) by creating and maximizing shallow-water habitat.

4.2.2.1.29 Socioeconomic Resources: Public Health and Safety Including Flood and Shoreline Protection – Affected Environment

All project sites are located within the low-lying floodplain of the Lower Mississippi River Valley, where periodic inundation occurs due to riverine and backwater flooding. Portions

of the project areas fall within mapped FEMA flood hazard zones; however, the sites are located within NWRs and WMAs and do not contain residential, commercial, or industrial development. Existing levees, ditches, and water-control structures within the project areas are used for habitat management and do not function as primary flood protection infrastructure for surrounding communities. Shoreline protection is not applicable due to the inland location of the project sites, and public health and safety risks are minimal under existing conditions given limited and controlled public access.

4.2.2.1.30 Socioeconomic Resources: Public Health and Safety Including Flood and Shoreline Protection – Environmental Consequences

See Table 4-1.

4.2.2.2  Birds2 – Restoration of Shorebird Habitat on Cat Island, MS

Under this alternative, MDEQ would restore beach/dune habitat on the northeast part of Cat Island, Harrison County, MS to provide nesting and foraging opportunities for Mississippi's shorebird population. The project would directly complement similar efforts on state-owned land in the southeastern section of Cat Island to be funded through the RESTORE Act. The project would restore the historical footprint of the northeastern portion of the island to an area approximate to habitats that existed in the early 1900s, totaling approximately 100 acres of additional bird habitat.

A source material of sand will be confirmed during engineering and design and will either be from a nearshore borrow area (Figure 2-5) or beneficial use material from a separate project. Dredged materials would be placed in the Mississippi Sound in the project area, including the intertidal zone and some upland placement to create and enhance dune restoration. If a separate dredging project is identified to provide the source material for beneficial placement for this project, the environmental compliance, including NEPA, would be performed for the dredge project area prior to commencement of the work, in compliance with all applicable federal and state laws. Dredging and placement would be conducted to depths and in quantities to be determined during final design and in accordance with any required federal and state permits.

Heavy equipment will be utilized to direct the dredge sediments, build toe dikes, and spread and grade the materials to create beach and dune bird habitat. ATVs will be utilized for inspections and transportation. Planting of native species could be conducted to stabilize the soils after placement of the dredged materials.

As noted in section 2.5.5 above, engineering and design for this project would be funded if the project is selected for implementation. In the absence of engineering and design details, the impacts of the project, particularly its potential effects on birds and protected species including sea turtles and Gulf sturgeon, are estimated below with the best information available at this time. If the project is selected for funding and implementation, once engineering and design details are available, the MS TIG will pursue all regulatory permitting requirements. During that process they will review the NEPA analysis in this RP5/EA and determine whether the anticipated impacts are within the bounds described

below. If anticipated impacts would be more adverse than what is discussed below, the MS TIG would determine whether to undertake additional environmental review, consistent with NEPA and other environmental compliance requirements, or forego implementation. Any necessary additional NEPA analysis would be prepared by the Implementing Trustee(s) or appropriate federal agency, approved by the Mississippi TIG, and included in the Administrative Record and DIVER once completed.

4.2.2.2.1 Physical Resources: Geology and Substrates – Affected Environment

Cat Island is part of the Mississippi–Alabama barrier island system, composed of Holocene-age marine and fluvial sands shaped by longshore transport and overwash processes. Soils in the project area consist primarily of well-sorted, quartz-rich sands that are excessively drained and low in organic content, with localized hydric pockets of mucky loam in back-barrier areas.

4.2.2.2.2 Physical Resources: Geology and Substrates – Environmental Consequences

The project would use dredge fill placement to restore shorebird habitat, resulting in long-term minor adverse effects to substrates as a result of dredging of fill materials from a nearshore borrow area, or from a separate dredging project which could provide the source material for beneficial placement for this project.

Dredging would result in bathymetric substrate changes but not geological changes. The placement of dredged materials in the littoral zone and adjacent upland areas of Cat Island would have short-term, minor adverse effects on soils due to localized soil compaction. The natural establishment of vegetation and/or plantings could serve to stabilize soils and reduce soil loss. Overall, restoration activities would have long-term beneficial effects to birds by restoring habitat that was damaged by the DWH oil spill.

4.2.2.2.3 Physical Resources: Hydrology, Water Quality, Wetlands, and Floodplains – Affected Environment

4.2.2.2.3.1 *Physical Resources: Hydrology.*

Cat Island's hydrology is tidally driven within the Mississippi Sound, a shallow estuarine system influenced by both Gulf exchange and freshwater inflow from the Pearl River and Biloxi Bay. The natural hydrologic regime is strongly influenced by barrier-island processes, particularly frequent overwash during storms that deposits sand across the island interior and reshapes the morphology. The island's natural features demonstrate a dynamic response to tidal, storm, and surge events.

4.2.2.2.3.2 *Physical Resources: Water Quality.*

The project area lies within the "Ship Island Pass Mississippi Sound" HUC12 watershed (#031700090804), identified as a priority watershed under the 2020 MDEQ Non-point Source Work Plan and subject to a 5-year management strategy to reduce nutrient and sediment loadings. The adjacent estuarine waters are influenced by historic and ongoing

inputs of nutrients, turbidity, and shoreline runoff from upland development and coastal erosion.

4.2.2.2.3.3 *Physical Resources: Wetlands.*

The USFWS National Wetlands Inventory (NWI) maps several estuarine and marine wetland types within the project area, including E1UBL (Estuarine Subtidal Unconsolidated Bottom), E2EM1P (Estuarine Intertidal Emergent Persistent, irregularly flooded), E2USM (Estuarine Intertidal Unconsolidated Shore, regularly flooded), E2USP (Estuarine Intertidal Unconsolidated Shore, irregularly flooded), M1UBL (Marine Subtidal Unconsolidated Bottom), and M2US2P (Marine Intertidal Unconsolidated Shore, irregularly flooded). These classifications correspond to the intertidal flats, sandy beaches, and shallow subtidal zones typical of Cat Island's nearshore environment.

4.2.2.2.3.4 *Physical Resources: Floodplain.*

According to FEMA FIRM Panel 28047C0525G (2009), the entire island is mapped as "Zone OPEN WATER" with a notation of "Map Not Printed," indicating that no detailed flood hazard delineation has been performed for this barrier island. Nonetheless, Cat Island is inherently subject to coastal flooding, storm surge, and overwash, which are integral components of its natural geomorphic and hydrologic regime.

4.2.2.2.4 Physical Resources: Hydrology, Water Quality, Wetlands, and Floodplains – Environmental Consequences

4.2.2.2.4.1 *Physical Resources: Hydrology.*

The project would have no adverse or beneficial effect on hydrology. See Table 4.1.

4.2.2.2.4.2 *Physical Resources: Water Quality.*

There would be short-term, minor, adverse impacts to water quality (increased turbidity) from disturbance of sediments associated with construction activities including dredging and placement of sediments, however, turbidity would dissipate rapidly. The utilization of construction BMPs as well as permit conditions would help to minimize the impacts of construction.

4.2.2.2.4.3 *Physical Resources: Wetlands.*

The disturbance of soil and sediments and increases in erosion during construction could lead to increased turbidity and sedimentation in nearby wetlands and waterbodies. However, these changes would be temporary and localized, quickly becoming undetectable, and would not change wetland function.

4.2.2.2.4.4 *Physical Resources: Floodplains.*

Construction of the alternative would not result in detectable changes to the natural floodplain.

4.2.2.2.5 Physical Resources: Air Quality – Affected Environment

The project activities would occur in Harrison County, which is classified by MDEQ as in attainment, meaning criteria air pollutants do not exceed NAAQS.

4.2.2.2.6 Physical Resources: Air Quality – Environmental Consequences

See Table 4-1.

4.2.2.2.7 Physical Resources: Noise – Affected Environment

The project activities would occur on a secluded barrier island with only a few residential homes; anthropogenic noise levels are low and limited primarily to marine and air transportation.

4.2.2.2.8 Physical Resources: Noise – Environmental Consequences

See Table 4-1.

4.2.2.2.9 Biological Resources: Habitats and Wildlife (Including Birds) – Affected Environment

On Cat Island the habitat mosaic includes beach, dune, back-barrier marshes and maritime forest zones, with typical vegetation such as sea oats (*Uniola paniculata*), salt-tolerant grasses and shrubs, and oak-pine woodland behind the dunes. Terrestrial and marsh bird species are supported by those habitats alongside shorebirds, such as plovers, sandpipers, yellowlegs, oystercatchers, and terns, as well as herons, egrets, and white ibises (*Eudocimus albus)*. Nearshore and marsh waters around Cat Island support estuarine fish species such as spotted seatrout (*Cynoscion nebulosus*), redfish (red drum), and Southern flounder (*Paralichthys lethostigma*), which forage along shallow sandbars, tidal channels, and the island's nearshore shallows. Common reptiles expected to occur on Cat Island include multiple snake species, green anoles, and alligators. Amphibians are naturally limited on saline barrier islands due to the lack of freshwater habitats.

4.2.2.2.10 Biological Resources: Habitats and Wildlife (Including Birds) – Environmental Consequences

The project could result in short-term, minor to moderate, adverse impacts to habitats during construction due to temporary displacement of birds and other wildlife during construction in the project area and the borrow areas. Birds would need to find other areas to forage and loaf during this time, and mammals would move to avoid construction activity; however, suitable habitats are available nearby. Adverse impacts to habitats and wildlife would be temporary and would be minimized through BMPs, and adherence to all stipulations and procedures outlined in the applicable consultations and permits. Long-term impacts include permanent loss of benthic habitat in localized dredge placement areas; however, due to the nature of the existing shallow water bottoms (i.e., sandy bottom with no SAV or wetlands) and on-beach placement site (i.e., sandy beach with no vegetation) there should be no basic change in overall productivity.

Following the restoration, wildlife would return quickly to the newly restored habitat. Impacts to nesting, foraging and overwintering habitats resulting from construction would be short-term, moderate, and adverse, but would be minimized by adherence to shorebird nesting BMPs. The project would provide long-term beneficial effects on habitat and wildlife, especially birds (piping plover, rufa red knot, black skimmer (*Rynchops niger)*, and

snowy plover (*Anarhynchus nivosus*)), by creating new sand beach and dune habitat for nesting, foraging, and loafing.

4.2.2.2.11 Biological Resources: Marine and Estuarine Fauna (fish, shellfish, benthic organisms) and Federally Managed Fisheries- Affected Environment

The nearshore waters surrounding Cat Island support a range of estuarine and marine fauna typical of the Mississippi Sound ecosystem. Finfish species commonly occurring in these habitats include Atlantic croaker, spotted seatrout, southern flounder, red drum, and Gulf menhaden (*Brevoortia patronus*). Shellfish resources include blue crab (*Callinectes sapidus*), brown shrimp (*Crangon crangon*), and white shrimp (*Crangon crangon*), which utilize shallow sandy substrates and nearshore algal or detrital mats for foraging and refuge.

Benthic invertebrate communities in the project area (See Figure 2-5) are expected to be sparse and composed primarily of opportunistic infaunal taxa (e.g., polychaete worms and small crustaceans) adapted to mobile, low-organic sandy substrates. No known oyster reefs or shellfish beds occur within or adjacent to the project area, and hard-bottom or structured benthic habitat is absent. According to the NOAA EFH Mapper, the project area overlaps EFH designated for the following Fishery Management Plans (FMPs):

Red Drum FMP: red drum (*Sciaenops ocellatus*) – all life stages

Shrimp FMP: brown shrimp, white shrimp, pink shrimp, and royal red shrimp (*Pleoticus robustus*) – all life stages

Reef Fish FMP: gray triggerfish (*Balistes capriscus*), greater amerjack (*Seriola dumerili*) dumerili) and lesser amberjack (*Seriola fasciata*), red snapper (*Lutjanus campechanus*) gray snapper *Lutjanus griseus*, gag (*Mycteroperca microlepis*), and scamp grouper (Mycteroperca phenax)– various life stages

Coastal Migratory Pelagics FMP: king mackerel (Scomberomorus cavalla) and Spanish mackerel (*Scomberomorus maculatus)* – juvenile to adult stages

Highly Migratory Species FMP: Atlantic sharpnose (*Rhizoprionodon terraenovae),* blacktip (*Carcharhinus limbatus)*, bull *Carcharhinus leucas*, finetooth (*Carcharhinus isodon*, spinner (*Carcharhinus brevipinna*), and tiger sharks (*Galeocerdo cuvier)* – juvenile to adult stages

No Habitat Areas of Particular Concern or EFH Areas Protected from Fishing are identified within the project footprint.

4.2.2.2.12 Biological Resources: Marine and Estuarine Fauna (fish, shellfish, benthic organisms) and Federally Managed Fisheries- Environmental Consequences

Impacts resulting from dredging the borrow source area and placement of dredged materials adjacent to the island would increase turbidity and temporarily affect EFH, including disruption of prey sources, noise disturbances, and impacts to spawning and feeding habitats due to turbidity and siltation. This could potentially cause short-term,

minor, adverse impacts to marine fauna, benthic organisms, and fisheries, but they would be localized and temporary.

Non-motile benthic fauna within the area would be adversely affected by dredging and placement operations but should repopulate within 12 months upon project completion. Motile benthic and pelagic fauna, such as crabs, shrimp, and fishes can avoid the disturbed area and should return shortly after the activity is completed. Larval and juvenile stages of these forms may not be able to avoid the activity due to limited mobility. Losses to the benthic and pelagic fauna should not be significant due to the small area (percentage wise) of ecosystem that would be affected at any given time. Turbidity minimization BMPs would be followed during all construction activities to minimize potential impacts. SAV surveys would be conducted prior to project implementation. Any BMPs or conservation recommendations resulting from EFH consultation with NMFS will be followed when working near SAV.

There would be a long-term impact to the approximately 80-90 acres of open water habitat that would be converted to uplands. However, open-water marine habitat is prolific in the proposed project area and Mississippi Sound, and therefore would not result in a substantive adverse change in available habitat in the region. Therefore, impacts to the marine and estuarine fauna and habitat would be minor.

4.2.2.2.13 Biological Resources: Protected Species – Affected Environment

The Cat Island project area overlaps potential habitat for several federally listed species managed under the ESA.

-Marine Turtles

Five sea turtle species are found in the northern Gulf of America, including loggerhead (*Caretta caretta*), green (*Chelonia mydas*), Kemp's ridley (*Lepidochelys kempii*), leatherback (*Dermochelys coriacea*), and hawksbill (*Eretmochelys imbricata*). Green, loggerhead, and Kemp's ridley sea turtles are regularly documented in the waters surrounding the barrier islands of Gulf Islands National Seashore[33] and all have been confirmed as nesting on the islands in the Mississippi Sound.

Green Sea Turtle – adults and juveniles migrate and forage within tidally influenced inshore Gulf waters. Green sea turtle nests have been found on the Mississippi islands; however, these nests are likely uncommon.

Kemp's Ridley Sea Turtle – adults and juveniles use nearshore waters for migration and foraging, and nesting has been documented.

Loggerhead Sea Turtle – adults and juveniles migrate and forage in the Gulf; nesting and hatchling movement may occur along the Mississippi coastal county buffer,

[33] Jones, W.R., and Enwright, N.M., 2023, Potential Sea Turtle Nesting Areas for Cat and Ship Island, Mississippi for various years from 1998 to 2020 (ver. 4.0, November 2025): U.S. Geological Survey data release, https://doi.org/10.5066/P945DYIZ.

including Harrison County, generally between April and November.

Waters within roughly one mile seaward of nesting beaches are of particular concern for ingress/egress of nesting females and hatchlings, and such areas are subject to NOAA Fisheries and USFWS co-jurisdiction.

-Gulf Sturgeon

Gulf sturgeon may occur in tidally influenced inshore waters of the Mississippi Sound for migration, foraging, and overwintering. The project area is within Critical Habitat Unit 8 (Lake Pontchartrain – Mississippi Sound) designated for this species.

-Giant Manta Ray

Giant Manta Ray (*Mobula birostris)* may occur in the inshore Gulf for migration, foraging, and mating throughout the year.

-Marine Mammals

The West Indian manatee (*Trichechus manatus*) may occasionally transit through Mississippi Sound waters, though sightings near Cat Island are rare. According to the US Atlantic and Gulf of Mexico Marine Mammal Stock Assessments (2021), Common bottlenose dolphins (*Tursiops truncatus*) are distributed throughout the bays, sounds, and estuaries of the northern Gulf (Mullin 1988). This stock area includes the Mississippi Sound, Lake Borgne, and Bay Boudreau. Per the report, "The best available abundance estimate for the Mississippi Sound, Lake Borgne, Bay Boudreau Stock of common bottlenose dolphins is 1,265 (CV=0.35; Table 1; Garrison et al. 2021). This estimate is from an aerial survey conducted during winter 2018."

According to the US Atlantic and Gulf of Mexico Marine Mammal Stock Assessments (2020), various species of large and small whales are dispersed in the Northern Gulf, but no whales are present in the immediate project area.

-Birds

Piping Plover – Winters and forages along sparsely vegetated beaches and tidal flats throughout the Mississippi mainland coast. The entirety of Cat Island is piping plover critical habitat. The primary constituent elements (PCEs) for the piping plover wintering habitat are those habitat components that are essential for the primary biological needs of foraging, sheltering, and roosting, and only those areas containing these PCEs within the designated boundaries are considered critical habitat. The PCEs on Cat Island occur on intertidal

beaches and flats, and associated dune systems and flats above annual high tide to mean lower low water (MLLW).[34] Piping plover does not nest on Cat Island.

Rufa Red Knot – Winters and forages along sparsely vegetated beaches and tidal flats throughout the Mississippi mainland coast. The entirety of Cat Island is proposed rufa red knot critical habitat. Rufa red knot may be present during construction during winter months, but does not nest on Cat Island.

4.2.2.2.14 Biological Resources: Protected Species – Environmental Consequences

There is the potential for short-term minor to moderate, adverse effects during construction for sea turtles that nest in the project area (that is, green, Kemp's ridley, and loggerhead sea turtles), and shorebirds (piping plover and red knot) and their associated designated critical habitat (piping plover). However, birds in particular are highly mobile and would likely avoid the construction area and return to the newly restored and created areas after construction is complete. Only the ground-disturbing work on the terrestrial portions of Cat Island that meet the PCEs could cause adverse effects on piping plover critical habitat. There have been no documented nests for listed bird species on Cat Island.

See Table 5.1 for this project's environmental compliance status. Project planning in consultation with the USFWS and NMFS would occur prior to implementation to identify mitigation strategies for dredge placement timing and activities to minimize adverse impacts to habitats, wildlife, and protected species. In past projects, mitigation strategies such as timing activities to avoid at-risk migratory birds and turtles have proven successful in reducing impacts to protected species. Conservation measures recommended during consultation and permitting would be incorporated into final project planning and implementation to avoid and/or minimize adverse impacts to protected species and critical habitats.

There is potential for short-term minor, adverse effects on marine protected species such as gulf sturgeon, giant manta ray, sea turtle species that do not nest in or frequent the project area (that is, leatherback and hawksbill sea turtle), and marine mammals including Atlantic bottlenose dolphin and West Indian manatee. Each of these species is vulnerable to project impacts resulting from displacement or disturbance in critical wintering habitat (shorebirds), temporary, localized noise impacts, injury or mortality due to disturbance of nesting beaches (green, Kemp's ridley and loggerhead) or entrapment or collisions with vessels and/or dredging equipment.

Dredged material would be delivered to the placement site via a pipeline that is submerged, floating, or a combination. Floating pipelines can be perceived as a barrier to marine

[34] Department of the Interior, Fish and Wildlife Service, 50 CFR Part 17 TIN 1018-AG13, Endangered and Threatened Wildlife and Plants; Final Determination of Critical Habitat for Wintering Piping Plover, July 10. 2001

mammal (specifically bottlenose dolphin) movement; as such, if recommended during environmental compliance review and if a floating pipeline is used, all BMPs provided by NOAA NMFS would be implemented.

BMPs would be implemented during construction to minimize the potential for impacts on protected species, including measures from the *Protected Species Construction Conditions* (NOAA NMFS, 2021a), *Measures for Reducing Entrapment Risk to Protected Species* (NOAA NMFS, 2012), *Vessel Strike Avoidance Measures and Reporting for Mariners* (NOAA NMFS, 2021b), and *Standard Manatee Conditions for In-water Work* (USFWS, 2011). Sea Turtle nest surveys would be conducted if the work is done during sea turtle nesting season. All stipulations and procedures outlined in the applicable consultations and permits would be followed accordingly.

There would be long-term benefits to protected species (shorebirds and potentially sea turtles) due to the addition of up to approximately 100 acres of bird and potentially sea turtle habitat, resulting in increased habitat quality and longevity. By restoring Cat Island, the project is expected to prolong the existence of barrier island habitat, which is essential for the restoration of shorebird population levels. The long-term benefits of this bird restoration project outweigh any potential temporary adverse impacts to protected bird species and wintering habitat. A bird monitor will be present during construction to limit potential impacts to foraging protected species, if required by USFWS.

In summary there would be short-term, minor to moderate adverse impacts to protected species from construction activities. These impacts would be avoided or minimized by the use of BMPs and other measures. The project would also provide long-term benefits to protected species, primarily birds.

4.2.2.2.15 Socioeconomic Resources: Economic Effects – Affected Environment

The median household income in Census Tract 36 is $24,495, which is lower than the median income in Mississippi ($59,127). The poverty rate in Census Tract 36 is 23.5%, which is higher than the poverty rate in Mississippi (17.8%).[35]

4.2.2.2.16 Socioeconomic Resources: Economic Effects – Environmental Consequences

See Table 4-1.

4.2.2.2.17 Socioeconomic Resources: Cultural Resources – Affected Environment

No known archaeological sites or historic structures are located within the project footprint.

[35] Harrison County, MS – Census Bureau Profile

4.2.2.2.18 Socioeconomic Resources: Cultural Resources – Environmental Consequences

See Table 4-1.

4.2.2.2.19 Socioeconomic Resources: Infrastructure – Affected Environment

Cat Island is a remote barrier island with no public infrastructure. Several private residences are located on the northern side of the island and are equipped with generators, cisterns, and septic systems.

4.2.2.2.20 Socioeconomic Resources: Infrastructure – Environmental Consequences

See Table 4-1.

4.2.2.2.21 Socioeconomic Resources: Land and Marine Management – Affected Environment

There are no land or marine management programs for Cat Island.

4.2.2.2.22 Socioeconomic Resources: Land and Marine Management – Environmental Consequences

See Table 4-1.

4.2.2.2.23 Socioeconomic Resources: Tourism and Recreation – Affected Environment

Cat Island provides recreational opportunities for private boaters, who enjoy fishing and relaxing in the natural scenic qualities of the island.

4.2.2.2.24 Socioeconomic Resources: Tourism and Recreation – Environmental Consequences

See Table 4-1.

4.2.2.2.25 Socioeconomic Resources: Fisheries and Aquaculture and Marine Transportation – Affected Environment

Waters surrounding Cat Island are used for recreational use (boating and fishing) and commercial fishing for shrimp, crab, and finfish. No aquaculture facilities occur nearby, and the project is outside federally maintained navigation channels.

4.2.2.2.26 Socioeconomic Resources: Fisheries and Aquaculture and Marine Transportation – Environmental Consequences

There are no aquaculture operations in or near the project area, so no effects to aquaculture are anticipated. The project could result in short-term, minor, adverse impacts to fisheries during construction. However, such effects would be temporary and would be minimized through BMPs, and all stipulations and procedures outlined in the applicable consultations and permits would be followed accordingly.

The project would not unreasonably interfere with or create obstructions to navigation on the surrounding waterways. Project activities would not occur within the federal navigation channels with the exception of the transit of ships, materials, and supplies to and from the project area, and only during short, limited periods of time during construction.

4.2.2.2.27 Socioeconomic Resources: Aesthetics and Visual Resources – Affected Environment

The project area consists of undeveloped barrier island landscape with natural views of open Gulf waters, sandy beaches, low dunes, and sparse coastal vegetation. Visual resources are limited to natural landforms and water features. The project would occur within an existing natural setting and would be consistent with the island's prevailing visual character.

4.2.2.2.28 Socioeconomic Resources: Aesthetics and Visual Resources – Environmental Consequences

Construction activities would cause short-term, minor adverse impacts to aesthetics and visual resources. However, the project would result in long-term, beneficial effects to aesthetics and visual resources, as the project would restore beach/dune habitat on the northern end of Cat Island, expanding the natural and scenic qualities of the area and restoring the island to its early 1900s footprint.

4.2.2.2.29 Socioeconomic Resources: Public Health and Safety Including Flood and Shoreline Protection – Affected Environment

The project area consists of undeveloped barrier island landscape with natural views of open Gulf waters, sandy beaches, low dunes, and sparse coastal vegetation. The project area is located within a floodplain.

4.2.2.2.30 Socioeconomic Resources: Public Health and Safety Including Flood and Shoreline Protection – Environmental Consequences

See Table 4-1.

4.2.2.3  Birds3 – Increased Nesting Success through Predator Management on Mainland Beaches

A predator management strategy for the benefit of Least Terns on the mainland beaches would be developed based on an existing USFWS management strategy that was based on the predator management strategy that was developed under the DWH NRDA project, Dauphin Island West End Acquisition, and implemented in another DWH NRDA Project, Stewardship of Coastal Alabama Beach Nesting Bird Habitat. Deterrent actions or habitat management actions that reduce predator use of the surrounding landscape would be used when aggressive methods are not feasible or desirable and for species that regularly prey on eggs or chicks but are rarely responsible for complete colony failure (e.g., Fish Crows, gulls, Gull-billed Terns). Specific actions might include pre-season aversion training using quail eggs injected with a distasteful but harmless chemical, perch removal or modification, and installation of wildlife-proof lids on trash cans located on the beach near colonies. More

aggressive or costly actions such as lethal control, capture and translocation, or installation of mammal exclusion fences could be considered for predator species that regularly lead to complete colony failure, such as raccoons, foxes, coyotes, and Great Horned Owl. Methods chosen would be implemented across the coast in a design to maximize information gain about the relative effectiveness of each method. Data collected during follow-up monitoring would be used to inform a long-term predator management plan.

4.2.2.3.1 Physical Resources: Geology and Substrates – Affected Environment

Mainland beaches in Hancock, Harrison, and Jackson Counties consist of fine to medium quartz sand derived from longshore sediment transport within the Mississippi Sound. These beaches are typically well-drained and low-relief, maintained by natural tidal and wind processes and periodic beach nourishment along developed shorelines. Substrates are unconsolidated and highly mobile, with limited vegetative stabilization due to routine maintenance and recreational use.

4.2.2.3.2 Physical Resources: Geology and Substrates – Environmental Consequences

There could be minor, short-term effects on soils during implementation of certain deterrent actions including installation of predator traps or installation of mammal exclusion fences.

4.2.2.3.3 Physical Resources: Hydrology, Water Quality, Wetlands, and Floodplains – Affected Environment

4.2.2.3.3.1 *Physical Resources: Hydrology.*

The mainland beaches occur along the northern shoreline of the Mississippi Sound, a shallow, tidal estuarine system influenced by freshwater inflows from the Pascagoula, Pearl, and Biloxi Rivers and exchange with the Gulf through passes of the Mississippi barrier islands. Surface hydrology is dominated by tidal inundation and storm surge events, with limited freshwater influence except near river mouths.

4.2.2.3.3.2 *Physical Resources: Water Quality.*

Coastal waters adjacent to the project area fall within the Mississippi Sound and Gulf Coast Basins, which have documented nutrient and pathogen impairments under Mississippi's 303(d) listings. Water quality is influenced by stormwater runoff, recreational use, and periodic dredge and nourishment activities but generally supports estuarine and marine life typical of the region.

4.2.2.3.3.3 *Physical Resources: Wetlands.*

Although the mainland beaches are manmade and periodically renourished, the USFWS National Wetlands Inventory (NWI) maps these areas as Estuarine Intertidal Unconsolidated Shore (E2USN/E2USP), which are sandy, largely unvegetated intertidal zones subject to regular tidal inundation and wave action. These mapped areas are non-vegetated by definition but grade landward into sparsely vegetated upper beach and dune habitat. The project area does not contain vegetated wetlands or hydric soils but is subject to coastal flooding and storm surge.

4.2.2.3.3.4 *Physical Resources: Floodplains.*

According to FEMA Flood Insurance Rate Maps, the Mississippi mainland beaches occur within Zones VE and AE, consistent with their exposure to coastal processes.

4.2.2.3.4 Physical Resources: Hydrology, Water Quality, Wetlands, and Floodplains –Environment Consequences

The predator traps would be installed periodically and temporarily on the man-made mainland beaches, and would therefore have no discernible effects on hydrology, water quality, wetlands, or floodplains.

4.2.2.3.5 Physical Resources: Air Quality – Affected Environment

The project activities would occur in Jackson, Harrison and Hancock counties, which are all classified by MDEQ as in attainment, meaning criteria air pollutants do not exceed NAAQS.

4.2.2.3.6 Physical Resources: Air Quality – Environmental Consequences

See Table 4-1.

4.2.2.3.7 Physical Resources: Noise – Affected Environment

Project activities would occur on mainland beaches in Jackson, Harrison and Hancock counties, in an urban setting bordered by the Mississippi Sound and Front Beach Drive and East Beach Drive/Shearwater/East Beach Drive in Jackson County; between the Mississippi Sound and U.S. Highway 90 in Harrison County; and between the Mississippi Sound and South Beach Boulevard in Hancock County. Ambient noise in the project areas range from minor (Jackson and Hancock counties) to minor to moderate in Harrison County, depending on the traffic level.

4.2.2.3.8 Physical Resources: Noise – Environmental Consequences

See Table 4-1.

4.2.2.3.9 Biological Resources: Habitats and Wildlife (Including Birds) – Affected Environment

The Mississippi mainland beaches consist of sandy coastal strand and upper beach habitats, transitioning from the largely unvegetated intertidal zone to sparsely vegetated back-beach and dune areas with scattered sea oats and bitter panicum *(Panicum amarum*). These habitats support nesting, foraging, and loafing areas for colonial and solitary shorebirds, including least terns, black skimmers, and Wilson's plovers (*Charadrius wilsonia*). Other commonly observed species include royal tern (*Thalasseus maximum*), sandwich tern (*Thalasseus sandavicensis*), laughing gull (*Leucophaeus atricilla)* sanderling (*Calidris alba*), and brown pelican (*Pelicanus occidentalis*). Mammalian predators such as raccoon, red fox and coyote occur along adjacent dune and urban interfaces and contribute to nest depredation.

4.2.2.3.10 Biological Resources: Habitats and Wildlife (Including Birds) – Environmental Consequences

The project goal is to beneficially affect bird nesting habitat on the Mississippi mainland beaches through predator management. The project would have long-term benefits to nesting bird species (least tern, black skimmer, and common tern (*Sterna hirundo*)), and would have long-term, minor adverse impacts on mammalian bird predator species such as raccoon, red fox, and coyote.

4.2.2.3.11 Biological Resources: Marine and Estuarine Fauna – Affected Environment

This project does not include any activities in marine or estuarine waters.

4.2.2.3.12 Biological Resources: Marine and Estuarine Fauna – Environmental Consequences

See Table 4-1.

4.2.2.3.13 Biological Resources: Protected Species – Affected Environment

Based on the USFWS IPaC Resources Report (2025), several federally listed species under the jurisdiction of the U.S. Fish and Wildlife Service may occur within or adjacent to Mississippi's mainland beaches in Hancock, Harrison, and Jackson counties. No project activities would occur within marine or submerged environments, and implementation on mainland beaches would avoid direct disturbance to any listed species or designated critical habitat.

-Birds

Piping Plover – Winters and forages along sparsely vegetated beaches and tidal flats throughout the Mississippi mainland coast. The project area includes Critical Habitat units.

Rufa Red Knot – Uses sandy beaches and intertidal flats during spring and fall migration.

Mississippi Sandhill Crane (*Antigone canadensis pulla*) – Restricted to the Mississippi Sandhill Crane National Wildlife Refuge and adjacent pine savanna habitats in Jackson County; not expected within active beach areas but included for regional consideration.

-Fish and Aquatic Species

Gulf Sturgeon (*Acipenser oxyrinchus desotoi*) – Although the project involves no in-water work USFWS-managed Critical Habitat Unit 8 (Lake Pontchartrain–Mississippi Sound) overlaps portions of the nearshore zone adjacent to the project area.

-Reptiles

Sea Turtles — Kemp's Ridley, Loggerhead, and Green. These species may

occasionally forage or migrate through Mississippi Sound, but nesting on mainland beaches is extremely rare. It is not anticipated that the project activities would affect the nesting behavior of sea turtles.

-Mammals

West Indian Manatee – Project activities would be limited to areas above the naturally occurring mean high water (MHW) mark; therefore, this resource category is not present within the project area.

4.2.2.3.14 Biological Resources: Protected Species – Environmental Consequences

Predator management strategy on the mainland beaches of Mississippi would result in no impacts to protected species and would also result in long-term beneficial effects to all birds that utilize the area.

4.2.2.3.15 Socioeconomic Resources: Economic Effects – Affected Environment

The employment rate in Hancock County is 55.5%, which is slightly lower than that for the state of Mississippi (55.7%). The top three employment sectors are employees of private company workers (65.2%); local, state, and government workers (17.7%); and private not-for-profit wage and salary workers (6.4%). The median household income in Hancock County is $67,728, which is higher than the median income in Mississippi ($59,127). The poverty rate in is 13.3%, which is lower than the poverty rate in Mississippi (17.8%).[36]

The employment rate in Harrison County is 53.9%, which is lower than that for the state of Mississippi (55.7%). The top three employment sectors are employees of private company workers (66.7%); local, state, and federal government workers (19.1%); and self-employed in own but not incorporated business workers and unpaid family workers (6.1%). The median household income in Harrison County is $64,014, which is higher than the median income in Mississippi ($59,127). The poverty rate is 15.7%, which is lower than the poverty rate in Mississippi (17.8%).[37]

The employment rate in Jackson County is 58.3%. which is higher than that for the state of Mississippi (55.7%). The top three employment sectors are employees of private company workers (65.5%); local, state, and federal government workers (19.4%); and construction (10.2%); private not-for profit wage and salary workers (5.6%). The median household income in Jackson County is $69,871, which is higher than the median income in Mississippi

[36] Hancock County, MS – Census Bureau Profile

[37] Harrison County, MS – Census Bureau Profile

($59,127). The poverty rate is 13.7%, which is lower than the poverty rate in Mississippi (17.8%).[38]

4.2.2.3.16 Socioeconomic Resources: Economic Effects – Environmental Consequences

See Table 4-1.

4.2.2.3.17 Socioeconomic Resources: Cultural Resources – Affected Environment

Mississippi's mainland beaches have undergone repeated episodes of natural erosion and artificial nourishment, and no known archaeological or historic properties are recorded within the routinely maintained active beach zone. If any subsurface cultural materials are encountered during project activities, work would cease pending coordination with the Mississippi Department of Archives and History (MDAH) in accordance with Section 106 of the National Historic Preservation Act.

4.2.2.3.18 Socioeconomic Resources: Cultural Resources – Environmental Consequences

See Table 4-1.

4.2.2.3.19 Socioeconomic Resources: Infrastructure – Affected Environment

Infrastructure on the Mississippi coastal mainland beaches includes storm drains pipes and associate infrastructure, parking lots, boat ramps, marinas, sand fencing, concrete vehicle ramps, and commercial development including hotels, shops and restaurants. Recreational amenities include public restrooms, vendor stands, walkways, fire pits, and shade structures.

4.2.2.3.20 Socioeconomic Resources: Infrastructure – Environmental Consequences

See Table 4-1.

4.2.2.3.21 Socioeconomic Resources: Land and Marine Management – Affected Environment

The USACE and the Jackson County Board of Supervisors, the Harrison County Sand Beach Authority, and the Hancock County Board of Supervisors are involved in the management and maintenance of the coastal mainland beaches. The beaches are manicured using heavy equipment and are renourished periodically. The majority of the sand beaches were constructed in the 1950s to protect seawalls constructed in the 1920s (the seawalls were constructed to provide protection for U.S Highway 90 and other public roads). The beaches offer abundant public recreational opportunities (fishing, swimming, boating) and

[38] Jackson County, MS – Census Bureau Profile

accommodate numerous commercial facilities and public use infrastructure including parking lots, restrooms, shade structures, fire pits, and piers.

4.2.2.3.22 Socioeconomic Resources: Land and Marine Management – Environmental Consequences

See Table 4-1.

4.2.2.3.23 Socioeconomic Resources: Tourism and Recreation – Affected Environment

Coastal Mississippi emerged as a significant tourist destination in the 1920s. Today, the tourism economy in coastal Mississippi is thriving, with a record 15.7 million visitors in 2024 contributing over $2.2 billion to the local economy.[39]

4.2.2.3.24 Socioeconomic Resources: Tourism and Recreation – Environmental Consequences

See Table 4-1.

4.2.2.3.25 Socioeconomic Resources: Fisheries and Aquaculture and Marine Transportation – Affected Environment

Project activities would be limited to areas above the naturally occurring mean high water (MHW) mark; therefore, this resource category is not present within the project area.

4.2.2.3.26 Socioeconomic Resources: Fisheries and Aquaculture and Marine Transportation – Environmental Consequences

The project area is the mainland sand beaches of Mississippi; therefore, the project would have no effects on aquaculture or marine transportation.

4.2.2.3.27 Socioeconomic Resources: Aesthetics and Visual Resources – Affected Environment

The project area consists of developed and semi-developed mainland beaches fronting on the Mississippi Sound. Visual resources include open views of the Gulf, public boardwalks, and adjacent urban infrastructure typical of Mississippi's coastal recreation corridor. Predator-management activities would take place within the existing visual setting and would not alter the overall coastal landscape character.

4.2.2.3.28 Socioeconomic Resources: Aesthetics and Visual Resources – Environmental Consequences

The project could have short-term minor adverse effects on aesthetics and visual resources due to the possible installation of traps and mammal exclusion devices on the sand beaches, which is a public recreational resource. However, these would only be installed for

[39] National Travel & Tourism Week | Coastal Mississippi | Coastal Mississippi

short durations (several months at a time) and would only be used as needed for predator species that regularly lead to complete colony failure, such as raccoons, foxes, coyotes, and Great Horned Owl.

4.2.2.3.29 Socioeconomic Resources: Public Health and Safety Including Flood and Shoreline Protection – Affected Environment

The Mississippi legislature passed legislation in 1924 calling for the protection of public highways along the shore, resulting in the construction of a seawall. In 1946, Congress enacted Public Law 727 to protect coastal communities and help control erosion, promoting the construction of artificial beaches to protect the seawalls. The USACE Mobile District is currently implementing the Coast-wide Beach and Dune Restoration Project across the three coastal counties, which will construct additional beach and dune habitat. Reconstruction of the dunes, where beaches exist, will provide a reduction of damaging wave action from smaller storms (i.e. normal summer storms, tropical storms, and/or lower energy hurricanes. The project is a part of the Mississippi Coastal Improvements Program for Hancock, Harrison and Jackson counties, MS, to address solutions for hurricane and storm damage risk reduction and shoreline erosion.[40]

4.2.2.3.30 Socioeconomic Resources: Public Health and Safety Including Flood and Shoreline Protection – Environmental Consequences

See Table 4-1.

4.2.3 Birds – No Action Alternative

4.2.3.1 Environmental Consequences Summary

In addition to the proposed alternatives previously discussed for the Birds Restoration Type, the MS TIG evaluated the No Action Alternative as a benchmark and basis for comparison of potential environmental consequences with the action alternatives.

The No Action Alternative would have no beneficial impacts because this alternative would largely result in a continuation of the conditions described in the PDARP/PEIS Chapters 3, Ecosystem Setting and Chapter 4, Injury to Natural Resources, and there would be no associated benefits to injured bird species by the restoration/improvement of habitat conditions or through predator management. Furthermore, a continuation of current conditions would be expected including poor quality habitat and reduced ecosystem function, including reduced nesting success for beach-nesting birds. The full suite of restoration benefits would not be realized solely with natural processes and without the opportunity for active restoration efforts and robust monitoring and adaptive management. The No Action Alternative does not meet the MS TIG's goals and objectives and clearly does

[40] https://www.sam.usace.army.mil/Portals/46/docs/program_management/mscip/docs/MsCIP%20final%20signed%20ROD%20Jan%2010.pdf

not provide the significant restoration benefit to Birds that would occur through the action alternatives.

4.3 Reasonably Foreseeable Effects of the Action Alternatives on DWH Restoration Efforts within the Mississippi Restoration Area

Under NEPA, the affected environment includes any reasonably foreseeable environmental trends and planned actions in the area to be affected by implementation of the proposed action or action alternatives (DOI NEPA Procedures at 23). The MS TIG tiers its restoration plans to the Final PDARP/PEIS, which analyzed the reasonably foreseeable effects of typical restoration techniques and approaches in the context of Restoration Types and Goals for the DWH program.

The Final PDARP/PEIS (Section 6.17.2) stated that consideration of environmental effects of proposed alternatives in RP/EAs should build on the programmatic analyses and focus on site-specific issues. Section 6.6 and Appendix 6.B of the Final PDARP/PEIS are incorporated by reference herein, including the methodologies for assessing additional reasonably foreseeable environmental impacts, identification of affected resources, and the reasonably foreseeable environmental effects scenario. The Trustees found that implementation of projects falling under the Restoration Types, Approaches, and Techniques analyzed in the Final PDARP/PEIS, such as those in this RP5/EA, would be consistent with the Final PDARP/PEIS Restoration Goals of the selected programmatic alternative (ecosystem-level restoration) and would not be expected to contribute substantially to short- or long-term, adverse reasonably foreseeable environmental effects on physical, biological, or socioeconomic resources when analyzed in combination with other past, present, and reasonably foreseeable future actions. The analysis below is consistent with that finding.

To evaluate the potential reasonably foreseeable environmental effects of the projects proposed in this RP5/EA, the MS TIG considered the effects of the proposed projects when added to past, present, and reasonably foreseeable future actions of the DWH restoration program and other DWH restoration efforts in the Mississippi Restoration Area that would be implemented by the agencies that comprise the TIG (i.e., DOI, NOAA, USDA, EPA, or MDEQ), including any indirect environmental effects from other projects funded by DWH NRDA, the RESTORE Act, and NFWF-GEBF. As the lead federal agency, DOI determined that (1) since these other projects are generally occurring at the same time and location as the proposed RP5/EA projects (within the Mississippi Restoration Area), (2) are under one or more of the Federal Trustee's regulatory authority, and (3) are being implemented by one of more of the members of the MS TIG, it is appropriate to evaluate the indirect environmental effects of these projects as part of the reasonably foreseeable effects analysis for this RP5/EA.

The implementation of the restoration projects proposed in RP5/EA would enhance the ongoing and planned DWH Restoration efforts of other DWH NRDA, RESTORE, and NFWF projects in the Mississippi Restoration Area. The proposed RP5/EA Nutrient Reduction project would reinforce and supplement the beneficial water quality effects of the ongoing

NRDA Upper Pascagoula River Water Quality Enhancement, Big Cedar Creek- Rocky Creek Nutrient Reduction, and Back Bay – Davis Bayou Nutrient Reduction projects, as well as the RESTORE Mississippi Gulf Coast Water Quality Improvement Program, and would contribute only short-term, minor adverse impacts to physical and biological resources.

The proposed Bird projects analyzed in this RP5/EA would also compound and enhance the benefits of ongoing and planned DWH projects to address habitat loss and degradation of nesting and foraging habitats for injured bird species in the Mississippi Restoration Area. Such projects include the Conservation and Enhancement of Nesting and Foraging Habitat and the Coastal Birds Migratory Bird Habitat Creation project (NFWF-GEBF), as well as the following NRDA projects: Grand Bay Land Acquisition and Habitat Management and Graveline Bay Land Acquisition and Management (see MS TIG RP4/EA); Improve Native Habitats by Removing Marine Debris from Mississippi Barrier Islands and Bird Stewardship and Enhanced Monitoring in Mississippi (see MS TIG RP3/EA); and Reducing Marine Debris Impacts on Birds and Sea Turtles (see Regionwide TIG RP1/EA). When considered together, these projects are anticipated to provide net benefits to migratory bird species and would not result in any significant, long-term adverse impacts. One of the proposed Bird restoration projects (Migratory Bird Habitat Creation in the Lower Mississippi Valley) would continue the benefits already provided by a completed NFWF project of the same name.

Since the past, present, and reasonably foreseeable future actions identified above are similar in nature or compatible with the action alternatives in this RP5/EA, the effects from the alternatives and the identified actions are expected to result in net beneficial impacts, and are not expected to contribute substantially to reasonably foreseeable adverse environmental impacts when added to other past, present, or reasonably foreseeable impacts.

A summary of environmental consequences of the evaluated alternatives is provided below in Tables 4-5, and 4-6.

Table 4-5: Summary of Environmental Consequences for Nutrient Reduction Projects

Project Activities/Resources	NR1- Nutrient Reduction and Hydrologic Restoration in Moss Point, MS	NR2-Big Cedar Creek-Rocky Creek Nutrient Reduction[41]
Project Activities	The NR1-Nutrient Reduction and Hydrologic Restoration in Moss Point, MS project would construct hydrologic and stormwater system enhancements at two locations to directly address nutrient loading in Moss Point, MS. First Street Stormwater Park: Activities would include constructing a variety of bioretention systems to slow stormwater and increase infiltration. Municipal stormwater infrastructure would be upgraded to direct water flow to the site. Trees, shrubs, seeded lawn and native grasses and perennials would also be planted as part of the nature-based solution approach to reduce nutrient pollution. Rain gardens and permeable pavement could be installed to promote infiltration. At the Khayat Park location, trees would be planted and a bioswale would be constructed to promote infiltration and reduce stormwater runoff.	The NR2-Big Cedar Creek-Rocky Creek Nutrient Reduction Alternative would focus on the enrollment of targeted tracts of agricultural and associated forested lands within the boundaries of four 12-digit HUC watersheds to reduce sediment and nutrient loading at the watershed level. USDA Conservation Practices are included here: Conservation Practice Standards Information | Natural Resources Conservation Service (usda.gov).
Physical Resources— Geology and Substrates	Minor, long-term adverse effects to soils are anticipated as a result of ground-disturbing construction activities to create the infrastructure for the Stormwater Park, including excavation of a stormwater detention feature and installation of rain gardens, as well as construction of bioswale in the Khayat Park Reforestation area. There would be long-term benefits to soils from the planting of vegetation which would reduce soil erosion.	**Streambank and Shoreline Protection (580)**: There would be short-term, minor to moderate adverse impacts activities associated with various conservation practices from grading, reshaping, and planting of stream banks, ponds, lakes, and other aquatic systems. There would be long-term beneficial impacts as stabilization would result in reducing the off-site, downstream effects of sediment, nutrients, and organic material into surface waters. **Grade Stabilization Structure (410)**: There would be short-term minor to moderate adverse impacts from soil excavation, grading, to construct or install grade stabilization structures including berms, rip rap, and hard structures. The majority of these would be installed in agricultural fields and could be installed in drainageways or tributaries. There would be long-term beneficial impacts to geology and soils from prevention of gully formation, reduction of soils, and drainageway stabilization. **Forest Stand Improvement (666**): There would be short-term, minor adverse impacts to soils from use of small equipment to access and complete operations which would include use of chainsaws to cut or kill trees or selected understory vegetation and dragging of felled materials. **Grassed Waterway (412)**: There would be short-term, minor to moderate adverse impacts from shaping or grading a channel and grading to form or install a stable outlet. The area would be replanted, where possible, with vegetation that would serve to reduce erosion and provide benefit to wildlife. There would be long-term benefit from controlling and managing flow to prevent soil erosion, increases in soil infiltration and increased soil biological activity, and trapping of sediments in the waterways. **Stream Crossing (578)**: There would be short-term, minor to moderate adverse impacts to the stream bed from stabilizing an area for designated crossing, installation of culverts or small bridges. In some cases, fences would be constructed to direct livestock or people to crossing. There would be long-term beneficial impacts resulting from livestock traversing the stream at one stabilized location versus traversing the stream in various locations. Fences would prevent riparian area grazing and resultant animal waste/nutrient contribution in and near waterways. **Terrace (600)**: There would be short-term minor to moderate, adverse impacts from soil excavation, grading, to construct or install terraces. The majority of these would be installed in agricultural fields. There would be long-term beneficial impacts to geology and soils from prevention of gully formation and reduction of soils erosion.

[41] The MS TIG RP1/EA provides an analysis of six (6) exemplar practices which represent the broader suite of over 50 practices that could be implemented for alternatives in that plan (Appendix A). The suite of practices used for the NR2-Big Cedar Creek-West Pascagoula River Nutrient Reduction Alternative would be the same. The MS TIG RP4/EA analysis has been incorporated by reference in this MS TIG RP5/EA.

Project Activities/Resources	NR1- Nutrient Reduction and Hydrologic Restoration in Moss Point, MS	NR2-Big Cedar Creek-Rocky Creek Nutrient Reduction[41]
Physical Resources—Hydrology, Water Quality, Wetlands and Floodplains	The project would provide long-term benefits to hydrology and water quality by intercepting and treating stormwater in a drainage basin and slowly releasing it, resulting in a reduction of nutrient pollution in adjacent coastal streams that lead to the Mississippi Sound. Reforestation would also provide long-term benefits to hydrology and water quality by reducing overland flow and sediment runoff and increasing infiltration and evapotranspiration. There could be short-term minor adverse effects on wetlands due to soil disruption during construction. BMPs would be in place to minimize wetlands impacts. However, there would be long-term, beneficial effects on wetlands due to increased wetland acreage due to the creation of the detention basin. There would be beneficial effects on floodplains because the stormwater park would promote infiltration, recharge groundwater in the surficial aquifer, restore wetland areas and ponds and increase storage capacity of storm water during flood events. The use of green infrastructure such as rain gardens, bioswales and permeable pavements would reduce flood risk while improving water quality.	**Streambank and Shoreline Protection (580)** **Water Quality**: There would be short- term, minor, adverse impacts from the potential for increased erosion during grading, reshaping, and planting of stream banks, ponds, lakes, and other aquatic systems. There would be long-term, beneficial impacts as this practice would result in stabilizing the waterbody and preventing further erosion. **Hydrology**: There would be short- term, minor, adverse impacts from grading, reshaping, and planting of stream banks, ponds, lakes, and other aquatic systems. These impacts would result from altered hydrologic flow in the stream during construction. There would be long-term beneficial impacts as this practice would result in restoring stream hydrology and provide the hydrologic benefits of riparian vegetation including staging of stormwater flows. **Grade Stabilization Structure (410)** **Water Quality**: There would be short-term, minor adverse impacts from the potential for increased erosion resulting from soil excavation, grading, to construct or install grade stabilization structures including berms, rip rap, and hard structures. Grade stabilization could be installed in agricultural fields and/or in drainageways or tributaries. There would be long-term, beneficial impacts from drainageway stabilization. **Hydrology**: There would be short-term, minor, adverse impacts from soil excavation, grading, to construct or install grade stabilization structures including berms, rip rap, and hard structures. The majority of these would be installed in agricultural fields and/or could be installed in drainageways or tributaries. There would be long-term, beneficial impacts to hydrology from prevention of gully formation, prevention of headcutting, and drainageway destabilization. **Forest Stand Improvement (666**) **Water Quality**: There would be no adverse impacts to water quality. There would be long-term benefits as a result of this practice including slowing runoff and increased filtration. **Hydrology**: There would be short-term, minor, adverse impacts to hydrology from use of small equipment to access and complete operations which would include use of chainsaws to cut or kill trees or selected understory vegetation, and dragging of felled materials. There would be long-term beneficial impacts from healthier forest stands including slowing runoff and increasing infiltration. **Grassed Waterway (412)** **Water Quality**: There would be short-term, minor to moderate, adverse impacts from the potential of increased erosion as a result of shaping or grading a channel and grading to form or install a stable outlet. These impacts would last until vegetation regrows. The area would be replanted, where possible, with vegetation that would serve to reduce erosion and provide benefit to wildlife. There would be long-term benefits from increased infiltration, filtration of water before it reaches the waterway, and erosion prevention. **Hydrology**: There would be no adverse impacts to hydrology from shaping or grading a channel and grading to form or install a stable outlet. The area would be replanted, where possible, with vegetation that would serve to reduce erosion and provide benefit to wildlife. There would be long-term benefits from controlling, managing, and slowing hydrologic flow and preventing soil erosion. **Stream Crossing (578)** **Water Quality**: There would be short-term, minor adverse impacts to water quality from the potential of increased erosion as a result of earth moving required to install a stream crossing. There would be long-term, beneficial impacts resulting from livestock traversing the stream at one stabilized location versus traversing the stream in various locations. If fences were installed with the practice, they would prevent riparian area grazing and ground cover grazing that would result in decreased infiltration. In urban settings there would be long-term beneficial effects to water quality where crossings serve to establish stream grade/stage stream flow, prevent erosion of streambeds, and prevent erosion of adjacent streambanks. **Hydrology**: There would be long-term, minor, adverse impacts to the streambed from stabilizing an area for designated crossing, installation of culverts or small bridges. There would be long-term beneficial impacts resulting from livestock traversing the stream at one stabilized location versus traversing the stream in various locations which could result in compromise of stream banks. **Terrace (600)** **Water Quality**: There would be short-term, minor to moderate, adverse impacts to water quality from the potential of increased erosion during soil excavation and grading to construct or install terraces. There would be long-term, beneficial impacts from the reduction of runoff that could contain contaminants, and prevention of erosion. **Hydrology**: There would be short-term, minor to moderate, adverse impacts from increased erosion during soil excavation and grading to construct or install terraces.

Project Activities/Resources	NR1- Nutrient Reduction and Hydrologic Restoration in Moss Point, MS	NR2-Big Cedar Creek-Rocky Creek Nutrient Reduction[41]
		There would be long-term, beneficial impacts from the reduction of runoff that could contain contaminants, and prevention of erosion. **Wetlands** There could be short-term, minor to moderate adverse impacts to wetlands depending on the location of the conservation practice. Wetlands would be avoided to the greatest extent possible. Any impacts would be localized to the conservation practice area. All conservation practices are intended to conserve and enhance important resources such as wetlands. The practices would typically have a long-term, beneficial, impact on wetlands, water quality, hydrology, and species composition in wetlands. **Floodplains**: Conservation practices would not result in a detectable change to natural and beneficial floodplain values. Stream crossings and grade stabilization structures installed in streams would be designed and constructed so as not to cause an appreciable rise in floodwaters.
Biological Resources— Habitats and Wildlife Species (including Birds)	There would be short-term, minor adverse impacts to habitats and wildlife species during construction from the use of heavy equipment and because of soil disturbance, but long term, the project would provide benefits Replanting native trees, shrubs, and groundcovers stabilizes the soil and increases biodiversity and provides vital habitats for a wide variety of wildlife, including birds, amphibians and minnows.	**Streambank and Shoreline Protection (580)**: There would be short-term, minor to moderate adverse impacts to habitats resulting from grading, reshaping, and planting of stream banks, ponds, lakes, and other aquatic systems. There would be long-term benefits to biodiversity by revegetating areas with native species. This practice would improve or enhance the stream corridor for fish and wildlife habitat. **Grade Stabilization Structure (410)**: There would be short-term, minor to moderate, adverse impacts to habitats from soil excavation, grading, to construct or install grade stabilization structures including berms, rip rap, and hard structures. Most of these grade stabilization structures would be installed in agricultural fields and could be installed in drainageways or tributaries. There would be long-term, beneficial impacts to aquatic wildlife by stabilizing stream and waterbody habitat and preventing sediment from entering waterways. **Forest Stand Improvement (666)**: There would be short-term, minor adverse impacts to wildlife and habitat from use of small equipment to access and complete operations which would include use of chainsaws to cut or kill trees or selected understory vegetation and dragging of felled materials. The use of equipment could damage vegetation and the noise of and activity in the area would cause wildlife to vacate the area during implementation. Wildlife would return after the practice is completed. As a result of this practice, plant health and productivity would improve; invasive species would be removed; and health and vigor of desirable plants and biodiversity would increase. This conservation practice would be designed to have a long-term benefit to habitat and wildlife. **Grassed Waterway (412)**: There would be short-term, minor, adverse impacts to habitats and wildlife from noise and activity disturbance during construction. Wildlife would vacate the area during construction but return after construction is finished. This practice would be done primarily on cropland and would not impact wildlife habitat. The area would be replanted, where possible, with vegetation that would serve to reduce erosion and provide a long-term benefit to wildlife. **Stream Crossing (578)**: There would be short-term, minor adverse impacts to wildlife and habitat from noise and potential vegetation clearing during stream crossing construction. Wildlife would vacate the area during construction but return after construction is finished. **Terrace (600)**: There would be short-term, minor, adverse impacts to wildlife and habitat due to potential vegetation clearing and noise disturbance from the use of equipment. Wildlife would vacate the area during construction but return after construction is finished.
Socioeconomic Resources— Infrastructure	There would be no adverse effect on infrastructure resources. This project would have a long-term beneficial effect on stormwater infrastructure by directing stormwater to the stormwater park where a variety of bioretention systems would slow stormwater and increase infiltration throughout the park, reducing nutrient pollution.	Not Applicable. This resource topic was not carried forward for detailed analysis because the project would not create increased demands on area infrastructure that could not be accommodated by existing infrastructure or would affect traffic and transportation in the area where the activities would occur.
Socioeconomic Resources— Aesthetics and Visual Resources	There would be no adverse effect on aesthetics and visual resources. There would be long-term benefits to these resources as the project areas would be improved with naturalized detention landscape, reforestation, rain gardens permeable pavement and native vegetation plantings, resulting in an aesthetically pleasing passive recreation park-like setting.	Conservation practices would be implemented on cropland, associated agriculture lands, pasture/grassland, and forestland. Conservation practices would be consistent with current land uses and with farming practices and would have a negligible effect on aesthetic and visual resources.

Table 4-6: Summary of Environmental Consequences for Birds Projects

Project Activities/Resources	Birds1-Lower Mississippi River Valley Migratory Bird Habitat Enhancement	Birds2-Restoration of Shorebird Habitat on Cat Island, MS	Birds3-Increased Nesting through Predator Management on Mainland Beaches
Project Activities	Project activities could include some or all of the following activities: • Heavy clearing (including mulching and chipping) to provide early successional emergent wetland habitat to establish herbaceous and woody control • Chemical treatment of unwanted vegetation • Using large excavators and bulldozers for addition and replacement of water control structure construction, enhancement, widening, repair, replacement, and removal to form manageable impoundments which have positive drainage and function properly • Using large excavators and bulldozers to ensure wetland units function properly as intended, by removal of debris and grading • Enhancement of wildlife openings by use of conventional tractors, bush hoggs and disks • Supplement on-going moist-soil management with Japanese millet plantings for wintering waterfowl • Controlling unwanted vegetation by chemical treatment and conduct/supplement on-going moist-soil management • Implementation of water delivery systems, including installation of new wells to allow for annual flooding capabilities • Cleaning and sloping drainage ditches	The Birds2-Restoration of Shorebird Habitat on Cat Island, MS Project would provide significant nesting and foraging opportunities for Mississippi's shorebird population through the creation of beach and dune habitat. Project activities would include dredging and placement of sand on state owned land along the northeastern tip of Cat Island to restore the historical footprint of the island.	The Birds3-Increased Nesting Success through Predator Management on Mainland Beaches Project would create and implement a predator management strategy to reduce their impact on injured species like the Least Tern. The site activities could include specific actions such as pre-season aversion training using quail eggs injected with a distasteful but harmless chemical, perch removal or modification, and installation of wildlife-proof lids on trash cans located on the beach near colonies. Deterrent actions or habitat management actions that reduce predator use of the surrounding landscape could be used when aggressive methods are not feasible or desirable and for species that regularly prey on eggs or chicks but are rarely responsible for complete colony failure There would also be opportunities to promote environmental stewardship, education, and outreach.
Physical Resources—Geology and Substrates	Minor, long-term adverse effects to soils are anticipated as a result of ground-disturbing construction activities including levee construction, enhancement, widening, repair, and removal to form manageable impoundment, addition and replacement of water control structures, implementation of water delivery systems, including installation of new wells to allow for annual flooding capabilities, cleaning and sloping drainage ditches, and heavy	Long-term minor adverse effects to substrates are anticipated if the dredging of fill materials occurs in a nearshore borrow area within the project area. This would result in bathymetric but not geologic changes. The placement of dredged materials in the littoral zone and adjacent upland areas of Cat Island would have short-term, minor adverse effects on soils due to localized soil compaction. The natural establishment of vegetation would serve to stabilize soils and reduce soil loss. Overall, restoration activities would have long-term beneficial effects to the geomorphologic character of Cat Island by restoring the island to habitats that existed in the early 1900s.	There could be minor, short-term adverse effects on soils during implementation of certain deterrent actions including installation of predator traps or installation of mammal exclusion fences.

Project Activities/Resources	Birds1-Lower Mississippi River Valley Migratory Bird Habitat Enhancement	Birds2-Restoration of Shorebird Habitat on Cat Island, MS	Birds3-Increased Nesting through Predator Management on Mainland Beaches
	clearing in some of the impoundments to provide early successional emergent wetland habitat.		
Physical Resources—Hydrology, Water Quality, Wetlands and Floodplains	Hydrology. Levee systems and controlled impoundments would modify hydrologic connectivity, resulting in long-term, minor, adverse effects on hydrology. Water Quality. There would be short-term, minor, adverse impacts to water quality from disturbance of sediments associated with construction activities including creation of manageable impoundments, cleaning and sloping drainage ditches, and heavy clearing in some of the impoundments. The managed impoundments and wetland units in these sites would provide long-term beneficial effects by serving partial buffering and treatment roles through sediment trapping and nutrient uptake by wetland vegetation. Wetlands. During construction, there could be short-term, minor, adverse effects from sediment movement that could temporarily adversely impact wetlands. Wetlands delineations would be conducted on the project areas, and any required permits will be acquired prior to construction. Overall, there would be long-term, net beneficial effects on wetlands though the creation of moist soil wetlands and agriculture wetlands with the ability to drain properly in multiple project areas in the LMRV. Floodplains. Due to the scale of the project, and the minimal fill involved, there would be no significant adverse impact to floodplains. NWRs and WMAs would retain significant floodplain function and continue to provide water-storage and sediment-trapping capacity.	Hydrology. The project would have no adverse or beneficial effect on hydrology Water Quality. There would be short-term, minor, adverse impacts to water quality (increased turbidity) from disturbance of sediments associated construction activities including dredging (if conducted within the project area) and placement of sediments, however, turbidity would dissipate rapidly. The utilization of construction BMPs as well as permit conditions would help to minimize the impacts of construction. Wetlands. The disturbance of soil and sediments and increases in erosion during construction could lead to increased turbidity and sedimentation in nearby wetlands and waterbodies. However, these changes would be temporary and localized, quickly becoming undetectable, and would not change wetland function. Floodplains. Construction of the alternative would not result in detectable changes to the natural floodplain.	Hydrology. The project would have no effects on hydrology; implementation activities would be minimally invasive, for example, installation of predator traps or installation of mammal exclusion fences on the mainland sand beaches. Water Quality. The project would have no effects on water quality; there would be no run-off from construction activities on the mainland sand beaches above the MHW mark. Wetlands. The project activities would not involve filling; there would be no effect on wetlands. Floodplains. The project area is located within the floodplain. However, site activities (for example, installation of predator traps or installation of mammal exclusion fences) would be minimal in scope and extent and would not adversely affect the natural and beneficial function of the floodplain.
Biological Resources—Habitats and Wildlife Species (including Birds)	There could be short-term, localized, minor, adverse impacts to wildlife during construction including elevated noise levels from construction and ground-disturbing activities. Affected species are	The project could result in short-term, minor, adverse impacts to habitats during construction due to temporary displacement of birds and other wildlife during construction in the project area and the borrow areas. Birds would need to find other areas to forage and loaf during this time, and mammals would move to avoid construction activity; however, suitable habitats are available nearby. Less than 100 acres of the total 3,200 acres of Cat Island would be affected by construction and most of that would be in-water work. Long-term impacts include permanent loss of benthic habitat in localized dredge placement areas;	The project goal is to beneficially affect bird habitat on the Mississippi mainland beaches, through predator management. The project would have a long-term minor adverse effect on habitat of mammalian bird predator species such as raccoon (Procyon lotor), red fox (Vulpes vulpes), and coyote (Canis

Project Activities/Resources	Birds1-Lower Mississippi River Valley Migratory Bird Habitat Enhancement	Birds2-Restoration of Shorebird Habitat on Cat Island, MS	Birds3-Increased Nesting through Predator Management on Mainland Beaches
	mobile and would likely exit the area during construction. Pre-construction nesting surveys for migratory birds and raptors on adjacent land would be conducted, if required, and if evidence of nesting is found, coordination with the USFWS would be initiated, to develop and implement appropriate conservation measures. Overall, the project would have long-term beneficial effects on habitats and wildlife.	however, due to the nature of the existing shallow water bottoms (i.e., sandy bottom with no SAV or wetlands) and on-beach placement site (i.e., sandy beach with no vegetation) there should be no basic change in overall productivity. Following the restoration, wildlife would return quickly to the newly restored habitat. Impacts to nesting, foraging and overwintering habitats resulting from construction would be short-term, moderate, and adverse, but would be minimized by adherence to shorebird nesting BMPs. The project would provide long-term beneficial effects on habitat and wildlife, especially birds, by creating new habitat for nesting, foraging and loafing.	latrans).
Biological Resources—Protected Species	No effects are anticipated.	There could be short-term, minor to moderate, adverse impacts to federally listed terrestrial species (nesting sea turtles and birds) from displacement and disturbance due to habitat disturbance, noise, vessels and equipment during construction. However, long-term, beneficial impacts to listed terrestrial species would result from the increase in available high-quality habitat and increase in island longevity after restoration implementation. There could be short-term minor, adverse impacts to marine listed species (Giant Manta Ray, Gulf Sturgeon and Marine Turtles) and marine mammals from disturbance due to noise, vessels, and equipment during construction. Technical assistance with relevant regulatory agencies related to potential adverse impacts to protected species and their habitats is complete for the planning phase. Project planning in consultation with the USFWS and NMFS would occur prior to implementation to identify mitigation strategies for dredge placement timing and activities to minimize adverse impacts to habitats, wildlife, and protected species. In past projects, mitigation strategies such as timing activities to avoid at-risk migratory birds and turtles have proven successful in reducing impacts to protected species. Conservation measures recommended during consultation and permitting would be incorporated into final project planning and implementation to avoid and/or minimize adverse impacts to protected species and critical habitats. There is potential for short-term minor, adverse effects on marine protected species such as gulf sturgeon, giant manta ray, sea turtle species that do not nest in or frequent the project area (that is, leatherback and hawksbill sea turtle), and marine mammals including Atlantic bottlenose dolphin and West Indian manatee. Each of these species is vulnerable to project impacts resulting from displacement or disturbance in critical wintering habitat (shorebirds), temporary, localized noise impacts, injury or mortality due to disturbance of nesting beaches (green, Kemp's ridley and loggerhead) or entrapment or collisions with vessels and/or dredging equipment. Dredged material would be delivered to the placement site via a pipeline that is submerged, floating, or a combination. Floating pipelines can be perceived as a barrier to marine mammal (specifically bottlenose dolphin) movement; as such, if recommended during environmental compliance review and if a floating pipeline is used, all BMPs provided by NOAA NMFS would be implemented. BMPs would be implemented during construction to minimize the potential for impacts on protected species, including measures from the Protected Species Construction Conditions (NOAA NMFS, 2021a), Measures for Reducing Entrapment Risk to Protected Species (NOAA NMFS, 2012), Vessel Strike Avoidance Measures and Reporting for Mariners (NOAA NMFS, 2021b), and Standard Manatee Conditions for In-water Work (USFWS, 2011). Sea Turtle nest surveys would be conducted if the work is done during sea turtle nesting season. All stipulations and procedures outlined in the applicable consultations and permits would be followed accordingly. There would be long-term benefits to protected species (shorebirds and potentially sea turtles) due to the addition of up to approximately 100 acres of bird and potentially sea turtle habitat, resulting in increased habitat quality and longevity. By restoring Cat Island, the project is expected to prolong the existence of barrier island habitat, which is essential for the restoration of shorebird population levels. The long-term benefits of this bird restoration project outweigh any potential temporary adverse impacts to protected bird species and wintering habitat. A bird monitor will be present during construction to limit potential impacts to foraging protected species, if required by USFWS. In summary there would be short-term, minor to moderate adverse impacts to protected species from construction activities. These impacts would be avoided or minimized by the use of BMPs and other measures. The project would also provide long-term benefits to protected species, primarily birds.	No effects are anticipated.

Project Activities/Resources	Birds1-Lower Mississippi River Valley Migratory Bird Habitat Enhancement	Birds2-Restoration of Shorebird Habitat on Cat Island, MS	Birds3-Increased Nesting through Predator Management on Mainland Beaches
Biological Resources—Marine and Estuarine Fauna (Fish, shellfish, benthic organisms) and Federally Managed Fisheries-Environmental Consequences	Based on the location of the project areas, the project would have no effect on fisheries and aquaculture or on marine transportation.	Dredging activities (if conducted within the project area) and placement of dredged materials adjacent to the island would have short-term minor adverse effects on fish fauna as turbidity increases when bottom sediments are disturbed. Species affected by the dredging activities within the borrow area and placement areas would likely move to a more suitable habitat resulting in no long-term adverse impacts. Dredging activities within the borrow area and placement areas may have several impacts on EFH, including disruption of prey sources, noise disturbances and impacts to spawning and feeding habitats due to turbidity and siltation. Impacts resulting from dredging the borrow source area would cause short-term, minor, adverse impacts to aquatic fauna, fisheries, and EFH, but they would be localized and temporary. Turbidity minimization BMPS would be followed during all construction activities to minimize potential impacts. SAV surveys would be conducted prior to project implementation, and SAVs would be avoided to the extent practicable and in accordance with environmental consultation determinations from NOAA NMFS HCD.	The project area is the mainland sand beaches of Mississippi; therefore, the project would have no effects on aquaculture or marine transportation.
Socioeconomic Resources—Fisheries and Aquaculture and Marine Transportation	Based on the location of the project areas, the project would have no effect on fisheries and aquaculture or on marine transportation.	There are no aquaculture operations in or near the project area, so no effects are anticipated. The project could result in short-term, minor, adverse impacts to fisheries during construction. However, such effects would be temporary and would be minimized through BMPs, and all stipulations and procedures outlined in the applicable consultations and permits would be followed accordingly. The project would not unreasonably interfere with or create obstructions to navigation on the surrounding waterways. Project activities would not occur within the federal navigation channels with the exception of the transit of ships, materials and supplies to and from the project area, and only during short, limited periods of time during construction.	The project area is the mainland sand beaches of Mississippi; therefore, the project would have no effects on aquaculture or marine transportation.
Socioeconomic Resources—Aesthetics and Visual Resources	Due to the character of the project areas, the project would have beneficial effects on the visual setting (expansive wetland landscapes, bottomland forest, and open water interspersed with levees and managed impoundments) by creating and maximizing shallow-water habitat.	The project would result in long-term, beneficial effects to aesthetics and visual resources, as the project would restore beach/dune habitat on the northern end of Cat Island, expanding the natural and scenic qualities of the area and restoring the island to its early 1900s footprint.	The project could have short-term minor adverse effects on aesthetics and visual resources due to the possible installation of traps and mammal exclusion devices on the sand beaches, which is a public recreational resource. However, these would only be installed for short durations (several months at a time) and would only be used as needed for predator species that regularly lead to complete colony failure, such as raccoons, foxes, coyotes, and Great Horned Owl.

5.0 Compliance with Other Environmental Laws and Regulations

The MS TIG will ensure compliance with all applicable state and local laws and other applicable federal laws and regulations relevant to the proposed restoration alternatives. The TIG has completed technical assistance reviews with relevant agencies for protected species and their habitats under the ESA, Magnuson-Stevens Fishery Conservation and Management Act (Magnuson-Stevens Act; which defines EFH), Marine Mammal Protection Act (MMPA), and other federal statutes, where appropriate. Technical assistance reviews for cultural resources, and any necessary consultations with state and tribal historic offices under the National Historic Preservation Act (NHPA), will be completed prior to implementation of activities with the potential to impact cultural resources. Finally, DOI, as the federal NEPA lead, will submit consistency determinations in accordance with the Coastal Zone Management Act (CZMA) to Mississippi Department of Marine Resources.

The current compliance status for each preferred alternative at the time of this RP5/EA is provided below in Table 5-1. The status of compliance for each statute by project is sorted into the following categories:

- Complete (C): indicates that the requirements have been met and a response was received from the appropriate agency(ies).
- In Progress (IP): indicates that compliance reviews have been requested but an answer has not yet been received from the regulatory agency(ies).
- Phased Compliance (Ph): indicates that for a preferred alternative, compliance will need to be reevaluated after initial planning has occurred and locations and methodologies for the work are determined. At that time, the MS TIG will have the information necessary to fully evaluate the potential effects.
- Not Applicable (N/A): indicates that the statute is not applicable to a preferred alternative, often due to the scope and/or location of the activities to be carried out under the alternative.

Implementing Trustees are required to implement alternative-specific mitigation measures (including BMPs) identified in this RP5/EA, biological evaluation forms, and completed consultations/permits. Oversight, provided by the Implementing Trustees, would include due diligence to ensure that no unanticipated effects to listed species and habitats occur, including ensuring that BMPs are implemented and continue to function as intended.

Federal environmental compliance responsibilities and procedures will follow the Trustee Council's SOPs, specifically Section 9.4.6 (DWH Trustees, 2021). Following these SOPs, the Implementing Trustees for each alternative will ensure that the status of environmental compliance (e.g., completed, in progress) is tracked through DIVER. The Implementing Trustees will keep a record of compliance documents (e.g., ESA letters, permits) and ensure that they are submitted for inclusion in the Administrative Record.

Table 5-1: Current Status of Federal Regulatory Compliance Reviews and Approvals of Preferred Alternatives at Release of this DRAFT RP5/EA

Preferred Alternatives			
	Restoration Type: Nutrient Reduction (Nonpoint Source)	Restoration Type: Birds	
	NR1 – Nutrient Reduction and Hydrologic Restoration in Moss Point, MS	Birds1 – Lower Mississippi River Valley Migratory Bird Habitat Enhancement	Birds2 – Restoration of Shorebird Habitat on Cat Island, MS
Coastal Zone Management Act (CZMA)	IP	IP	IP
Endangered Species Act - Section 7 (NMFS)	N/A	N/A	IP-Ph
Endangered Species Act - Section 7 (USFWS)	C-NE	C- NLAA	IP-Ph
Magnuson Stevens Act (EFH) (NMFS)	N/A	N/A	IP-Ph
Marine Mammal Protection Act (MMPA) (NMFS)	N/A	N/A	IP-Ph
Marine Mammal Protection Act (MMPA) (USFWS)	N/A	N/A	IP-Ph
National Historic Preservation Act (NHPA)	C	IP	IP
Rivers and Harbors Act/Clean Water Act (USACE permit)	IP	IP	IP
Bald and Golden Eagle Protection Act (BGEPA)	C-NE	C-NLAA	IP-Ph
Migratory Bird Treaty Act (MBTA)	C-NE	C-NLAA	IP-Ph
Coastal Barrier Resources Act (CBRA)	N/A	N/A	IP
C-Complete C-EC: Complete, covered by existing compliance C-NE: Complete, no effect C-NLAA: Complete, not likely to adversely affect	IP: In progress N/A: Not applicable	IP-Ph-In Progress, Phased Compliance Review	

5.1 Additional Laws

Examples of applicable laws or Executive Orders (EOs) include, but are not necessarily limited to, those listed below. Additional details on each of these can be found in the PDARP/PEIS (Chapter 6; DWH Trustees, 2016). Additional federal laws may apply to the alternatives considered in this RP5/EA. Legal authorities applicable to restoration

alternative development were fully described in the context of the DWH restoration planning in the PDARP/PEIS, Section 6.9 Compliance with Other Applicable Authorities and Appendix 6.D Other Laws and Executive Orders. That material is incorporated by reference here.

- 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 (54 U.S.C. § 300101 *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 (16 U.S.C. § 1431 *et seq*. and 33 U.S.C. § 1401 *et seq*.)
- Estuary Protection Act (16 U.S.C. §§ 1221–1226)
- Archaeological Resource Protection Act (16 U.S.C. §§ 470aa–470mm)
- National Marine Sanctuaries Act (16 U.S.C. § 1431 *et seq*.)
- Farmland Protection Policy Act (7 U.S.C. § 4201–4209)
- EO 11988: Floodplain Management (May 24, 1977), as amended
- EO 11990: Protection of Wetlands (May 24, 1977), as amended
- EO 12962: Recreational Fisheries (June 7, 1995), as amended
- EO 13007: Indian Sacred Sites
- EO 13045: Protection of Children from Environmental Health Risks and Safety Risks (Apr. 23, 1997), as amended
- EO 13112: Safeguarding the Nation from the Impacts of Invasive Species (Feb. 3, 1999), as amended
- EO 13175: Consultation and Coordination with Indian Tribal Governments (Nov. 6, 2000)
- EO 13186: Responsibilities of Federal Agencies to Protect Migratory Birds (Jan. 10, 2001)
- EO 14154: Unleashing American Energy (Jan. 20, 2025)
- EO 14172: Restoring Names That Honor American Greatness (Feb. 9, 2025)
- EO 14224: Designating English as the Official Language of the United States (March 1, 2025)

6.0 Literature Cited

Dewitz, J., and U.S. Geological Survey. 2021. National Land Cover Database (NLCD) 2019 Products (ver. 2.0, June 2021): U.S. Geological Survey data release. Available: https://www.fws.gov/doiddata/dwh-ar-documents/6510/DWH-ARZ012142.pdf

DWH Trustees. 2012. *Deepwater Horizon* Oil Spill Phase I Early Restoration Plan and Environmental Assessment. Available: https://www.fws.gov/doiddata/dwh-ar-documents/1000/DWH-AR0215754.pdf

DWH Trustees. 2014. *Deepwater Horizon* Oil Spill Programmatic and Phase III Early Restoration Plan and Early Restoration Programmatic Environmental Impact Statement. Available: https://www.fws.gov/doiddata/dwh-ar-documents/1102/DWH-AR0212189.pdf

DWH Trustees. 2015. *Deepwater Horizon* Oil Spill Final Phase IV Early Restoration Plan and Environmental Assessments. Available: https://www.fws.gov/doiddata/dwh-ar-documents/1126/DWH-AR0294749.pdf

DWH Trustees. 2016. *Deepwater Horizon* Oil Spill: Final Programmatic Damage Assessment and Restoration Plan (PDARP) and Final Programmatic Environmental Impact Statement (PEIS). Available: https://www.fws.gov/doiddata/dwh-ar-documents/3311/DWH-ARZ005514.pdf

DWH Trustees. 2016. Record of Decision for the *Deepwater Horizon* Oil Spill: Final Programmatic Damage Assessment and Restoration Plan (PDARP) and Final Programmatic Environmental Impact Statement (PEIS). Available: https://www.fws.gov/doiddata/dwh-ar-documents/1139/DWH-AR0307647.pdf

DWH Trustees. 2021a. Monitoring and Adaptive Management Procedures and Guidelines Manual, Version 2.0. Available: https://www.fws.gov/doiddata/dwh-ar-documents/1222/DWH-ARZ010013.pdf

DWH Trustees. 2021b. Trustee Council Standard Operating Procedures for Implementation of the Natural Resource Restoration for the *Deepwater Horizon* (DWH) Oil Spill. Available: https://www.fws.gov/doiddata/dwh-ar-documents/1184/DWH-ARZ009580.pdf

Federal Emergency Management Agency (FEMA). 2023. Glossary. https://www.fema.gov/about/glossary

FEMA. Site Accessed October 2025. Available: https://msc.fema.gov/portal/firmette?latitude=30.241137&longitude=-89.067066

FEMA. 2021. National Flood Hazard Layer (NFHL) Viewer. Site Accessed October 2025 Available: https://hazards-fema.maps.arcgis.com/apps/webappviewer/index.html

FEMA Flood Insurance Rate Maps. Site accessed October 2025. Available: https://msc.fema.gov/portal/home

Gulf of Mexico Fishery Management Council and National Oceanic and Atmospheric Administration. 2016. Final Report 5-Year Review of Essential Fish Habitat Requirements. Site Accessed October 2025. Available: https://www.fws.gov/doiddata/dwh-ar-documents/6123/DWH-ARZ006392.pdfHayes, Sean H. (editor) et al. 2022. NOAA Technical Memorandum NMFS-NE; 288. U.S. Atlantic and Gulf of Mexico Marine Mammal Stock Assessments 2021. Available: https://doi.org/10.25923/6tt7-kc16

Jones, W.R., and Enwright, N.M., 2023, Potential Sea Turtle Nesting Areas for Cat and Ship Island, Mississippi for various years from 1998 to 2020 (ver. 4.0, November 2025): U.S. Geological Survey data release, https://doi.org/10.5066/P945DYIZ.

Mississippi Coastal Improvements Program (MsCIP). 2009. Comprehensive Plan and Integrated Programmatic Environmental Impact Statement. Available: https://www.fws.gov/doiddata/dwh-ar-documents/1162/DWH-AR0111577.pdf

Mississippi Department of Archives and History (MDAH). n.d. Historic Resources Inventory Map. Retrieved March 21-23, 2023. Available: https://www.apps.mdah.ms.gov/mapping_pub/index.html?pk=home&wid=MDAH%20Search&caller=public/search.aspx&realm=archist&scope=home&aspect=public&route=in

MDAH Historic Resources Inventory Map. Site Accessed October 2025. Available: https://www.apps.mdah.ms.gov/mapping_pub/index.html?pk=home&wid=MDAH%20Search&caller=public/search.aspx&realm=archist&scope=home&aspect=public&route=in

Mississippi Department of Environmental Quality (MDEQ). 2022. MDEQ Office of Pollution Control, Surface Water Division, Water Quality Modeling and Total Maximum Daily Load (TMDL) Branch. 2022. MDEQ TMDL Tool (V1.31). Available: TMDL Tool

MDEQ Office of Geology, Open-File Report 285: Surface Geology of Jackson County, Mississippi. Site Accessed October 2025 Available: https://geology.deq.ms.gov/surface/files/OF285.pdf

MDEQ Office of Geology, Open-File Report 354: Geologic Map of the Mississippi River Alluvial Plain. Site Accessed October 2025. Available: https://www.mdeq.ms.gov/wp-content/uploads/2025/05/OF0354.pdf

MDEQ Water Quality Division. Site Accessed October 2025. Available: https://www.mdeq.ms.gov/wp-content/uploads/2020/07/MS-NPS-GY20-Work-Plan_final_revised_increase_new-Table_1_04022020.pdf

Mississippi Department of Environmental Quality (MDEQ). January 2022. State of Mississippi Section 303 (d) List of Waterbodies Decision Form. Bayou Casotte. Available: https://attains.epa.gov/attains-public/api/documents/assessments/17105/MS200313/207217

Mississippi Department of Marine Resources. GOMESA Portal. GOMESA Application Details. Site Accessed Oct 2025. Available: https://gomesa.dmr.ms.gov/gomesaapps/details?id=1060

Mississippi Department of Marine Resources. Accessed October 2025. Available: https://dmr.ms.gov/wp-content/uploads/2019/07/fish-poster.pdf

Mississippi Department of Wildlife, Fisheries, and Parks (MDWFP). 2001. Endangered Species of Mississippi. Mississippi Museum of Natural Science. Jackson Mississippi. Available: https://www.fws.gov/doiddata/dwh-ar-documents/1278/DWH-ARZ001186.pdf

Mississippi Department of Wildlife. Fisheries, and Parks (MDWFP) Fisheries Division – Mississippi River Basin Summary. 2024. Available: https://www.mdwfp.com/sites/default/files/2024-12/MDWFP-2024-Annual-Report%20Digital%20V2.pdf

Mississippi Land Conservation Assistance Network. 2022. Jourdan River Preserve. Available: https://www.mississippilandcan.org/local-resources/Jourdan-River-Preserve/25662

MS TIG 2017. Mississippi Trustee Implementation Group 2016-2017 Restoration Plan/Environmental Assessment; Restoration of Wetlands, Coastal, and Nearshore Habitats; Birds, and Nutrient Reduction. Available: https://www.fws.gov/doiddata/dwh-ar-documents/1272/DWH-ARZ000488.pdf

MS TIG 2024. Mississippi Trustee Implementation Group Restoration Plan 4 and Environmental Assessment: Restoration of Wetlands, Coastal, and Nearshore Habitats; Nutrient Reduction (Nonpoint Source); and Provide and Enhance Recreational Opportunities. Available: https://www.fws.gov/doiddata/dwh-ar-documents/6504/DWH-ARZ012486.pdf

NMFS. 2016. Framework Biological Opinion on Deepwater Horizon Oil Spill Final Programmatic Damage Assessment and Restoration Plan and Final Programmatic Environmental Impact Statement (SER-2015- 17459). Available: https://www.fws.gov/doiddata/dwh-ar-documents/4010/DWH-ARZ009644.pdf

NMFS. 2021. Protected Species Construction Conditions, NOAA Fisheries Southeast Regional Office. Southeast Regional Office. St. Petersburg, Florida. Available: https://www.fws.gov/doiddata/dwh-ar-documents/4722/DWH-ARZ009947.pdf

NMFS. 2021. Vessel Strike Avoidance Measures, NOAA Fisheries Southeast Regional Office. St. Petersburg, Florida. Available: https://www.fws.gov/doiddata/dwh-ar-documents/4722/DWH-ARZ009939.pdf

NMFS. 2012. Measures for Reducing Entrapment Risk to Protected Species. Southeast Regional Office. St. Petersburg, Florida. Revised May 22. Available: https://www.fws.gov/doiddata/dwh-ar-documents/3110/DWH-ARZ009591.pdf

National Oceanic and Atmospheric Administration (NOAA) Fisheries. 2023. Critical Habitat: Critical Habitat Designations, Maps, and GIS Data. Available: https://www.fisheries.noaa.gov/national/endangered-species-conservation/critical-habitat#critical-habitat-designations,-maps,-and-gis-data

NOAA Fisheries. 2020. Essential Fish Habitat Mapper: Gulf of Mexico. Available: https://www.habitat.noaa.gov/apps/efhmapper

NOAA Fisheries Southeast Region. 2021. ESA Section 7 Mapper (Beta). Available: https://noaa.maps.arcgis.com/apps/webappviewer/index.html

NOAA Office of Coast Survey. 2023. Electronic Navigational Chart (ENC) Viewer. Updated March 16, 2023. Retrieved July 21, 2025. Available: https://nauticalcharts.noaa.gov/enconline/enconline.html

NOAA Fisheries. Site Accessed October 2025. EFH Mapper. Available: https://www.habitat.noaa.gov/apps/efhmapper/

NRCS SSURGO Database - Web Soil Survey. Site Accessed October 2025. Available: https://sdmdataaccess.sc.egov.usda.gov/

Priddy, R.R., et.al., 1955. Sediments of Mississippi Sound and inshore waters. Available: https://www.fws.gov/doiddata/dwh-ar-documents/1163/DWH-AR0131573.pdf

RW TIG. 2021. Regionwide Trustee Implementation Group Final Restoration Plan/Environmental Assessment 1: Birds, Marine Mammals, Oysters and Sea Turtles. DWH-ARZ008721.pdf (fws.gov). Available: https://www.fws.gov/doiddata/dwh-ar-documents/3904/DWH-ARZ009757.pdf

Rogillio, H.E., Ruth, R.T., Behrens, E.H., Doolittle, C.N., Granger, W.J., and Kirk, J.P. 2007. Gulf sturgeon movements in the Pearl River drainage and the Mississippi Sound. North American Journal of Fisheries Management 27: 89–95. Available: https://www.fws.gov/doiddata/dwh-ar-documents/1278/DWH-ARZ001570.pdf

Ross, S. T., W. Todd Slack, Ryan J. Heise, Mark A. Dugo, Howard Rogillio, Bryant R. Bowen, Paul Mickle and Richard W. Heard. “Estuarine and coastal habitat use of Gulf sturgeon (Acipenser oxyrinchus desotoi) in the North-Central Gulf of Mexico.” Estuaries and Coasts DOI 10.1007/s12237-008-9122-z (November 7, 2008). Available: https://www.fws.gov/doiddata/dwh-ar-documents/1278/DWH-ARZ001572.pdf

Soil Survey Staff, Natural Resources Conservation Service (NRCS). United States Department of Agriculture. Web Soil Survey. Retrieved February 15, 2023. Available: http://websoilsurvey.nrcs.usda.gov/

USFWS National Wetlands Inventory. Site Accessed October 2025. Available: https://www.fws.gov/program/national-wetlands-inventory

The Nature Conservancy. Coastal Streams and Habitat Initiative; A Conservation Action Plan for Nine Mississippi Coastal Streams. September 2016. Available: https://www.fws.gov/doiddata/dwh-ar-documents/4722/DWH-ARZ009944.pdf

TMDL for the Legacy Pesticides, DDT, and Toxaphene in the Yazoo River Basin. Site Accessed October 2025. Available: https://attains.epa.gov/attains-public/api/documents/actions/21MSWQ/12247/102568

United States Census Bureau Profile. (2024). Retrieved January 29, 2026. Available: Census.gov | U.S. Census Bureau Homepage

United States Army Corps of Engineers (USACE) Mobile District. 2023. General Permits for Minor Structures and Activities in the State of Mississippi and Outer Continental Shelf Waters off the Coast of Mississippi within the Regulatory Boundaries of the Mobile District and Within the Regulatory Boundaries of the Vicksburg District in Hancock County, U.S. Army Corps of Engineers. Available: https://www.sam.usace.army.mil/Portals/46/2023%20Mississippi%20General%20Permits.pdf

USACE Vicksburg District. River Operations Site Accessed Oct 2025 Available : https://www.mvk.usace.army.mil/Missions/Operations-Division/River-Operations/

USACE Mississippi River and Tributaries Program Reports. Site Accessed October 2025. Available: https://www.mvd.usace.army.mil/About/Mississippi-River-Commission-MRC/Mississippi-River-Tributaries-Project-MR-T/

United States Environmental Protection Agency (USEPA). 2026. Current Nonattainment Counties for All Criteria Pollutants. Available: https://www3.epa.gov/airquality/greenbook/ancl.html

USEPA. How's My Waterway?, Waterbody Report, Rhodes Bayou Site Accessed Oct 2025.Available: https://mywaterway.epa.gov/waterbody-report/21MSWQ/MS426411/2024

USEPA. How's My Waterway? Waterbody Report, Bayou Casotte. Site Accessed Oct 2025. Available: https://mywaterway.epa.gov/waterbody-report/21MSWQ/MS200313

United States Fish and Wildlife Service (USFWS). 2023. Environmental Conservation Online System (ECOS) USFWS Threatened & Endangered Species Active Critical Habitat Report. Available: https://ecos.fws.gov/ecp/report/table/critical-habitat.html

USFWS. 2023. Information for Planning and Consultation (IPaC). Available: https://ipac.ecosphere.fws.gov/

USFWS. 2025. Federally Endangered, Threatened, and Candidate Species in Mississippi. Mississippi Field Office. March. Available: https://www.fws.gov/sites/default/files/documents/2025-04/ms-tes-consultation-information_final_2025_v2.pdf

USFWS. 2011. Standard Manatee Conditions for In-water Work. Available: https://www.fws.gov/doiddata/dwh-ar-documents/3810/DWH-ARZ005450.pdf

Wildlife Mississippi. Sky Lake. Site Accessed Oct 2025.Available: https://wildlifemiss.org/sky-lake-boardwalk-and-paddling-trail/

Multiple sources: Hydrology, Water Quality, Wetlands, and Floodplains. Sites Accessed October 2025. Available: Holt Collier Comprehensive Conservation Plan www.fws.gov/sites/default/files/documents/theodore-roosevelt-holt-collier-nwrs.pdf; Panther Swamp Comprehensive Conservation Plan: https://www.fws.gov/carp/sites/default/files/documents/THR_Wilkens_2006_CCP.pdf; MDWFP WMA Management Pages, 2024 - Muscadine Farms: https://www.mdwfp.com/wildlife-hunting/wmas/muscadine-farms-wma; Sky Lake: https://www.mdwfp.com/wildlife-hunting/wmas/sky-lake-wma; Howard Miller: https://www.mdwfp.com/wildlife-hunting/wmas/howard-miller-wma; O'Keefe: https://www.mdwfp.com/wildlife-hunting/wmas/okeefe-wma; Mahanna: https://www.mdwfp.com/wildlife-hunting/wmas/mahannah-wma; USGS National Hydrography Dataset: https://www.usgs.gov/national-hydrography

Multiple sources: Hydrology, Water Quality, Wetlands, and Floodplains. Sites Accessed October 2025. Available: https://www.fws.gov/refuge/cat-island/visit-us/activities/birding; https://www.nps.gov/guis/learn/nature/reptiles.htm; https://msgulfcoastheritage.ms.gov/natural/blueways/cat-island; https://pubs.usgs.gov/of/2009/1250/pdf/Cat400.pdf

7.0 List of Preparers and Reviewers

Table 7-1: List of Preparers and Reviewers

AGENCY/FIRM	NAME	POSITION
MISSISSIPPI DEPARTMENT OF ENVIRONMENTAL QUALITY		
MDEQ	Valerie Alley	Program Management Division Chief-Office of Restoration
MDEQ	Anderson Thomas	Senior Attorney
Balch & Bingham LLP	Bradley A. Ennis	Attorney
Covington Civil & Environmental, LLC	Alane C. Young	Senior Geologist
Covington Civil & Environmental, LLC	Rachel Kistler	Environmental Consultant
NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION		
National Oceanic and Atmospheric Administration	Grant Blumberg	Attorney
National Oceanic and Atmospheric Administration	Stella Wilson	Marine Habitat Restoration Specialist
National Oceanic and Atmospheric Administration	Ramona Schreiber	Marine Habitat Restoration Specialist
U.S. DEPARTMENT OF AGRICULTURE		
Natural Resources Conservation Service, Gulf Coast Ecosystem Restoration Team	Ronald Howard	Senior Technical Advisor
Natural Resources Conservation Service, Gulf Coast Ecosystem Restoration Team	Craig Johnson	Program Specialist
Natural Resources Conservation Service, Gulf Coast Ecosystem Restoration Team	Jon Morton	Biologist
U.S. ENVIRONMENTAL PROTECTION AGENCY		
Gulf of America Division	Tripp Boone	Physical Scientist
Gulf of America Division	Calista Mills	Physical Scientist
U.S. Environmental Protection Agency	Tim Landers	Life Scientist
U.S. DEPARTMENT OF THE INTERIOR		
U.S. Department of the Interior	Cody Haynes	Restoration Biologist
U.S. Department of the Interior	Amy Mathis	DWH Restoration Planner
U.S. Department of the Interior	Katharine Bleau	Attorney-Advisor

Appendix A
Monitoring and Adaptive Management

Nutrient Reduction1, Nutrient Reduction and Hydrologic Restoration in Moss Point, MS: Monitoring and Adaptive Management Plan

Table of Contents

1.0 Introduction

This Monitoring and Adaptive Management (MAM) Plan identifies the monitoring needed to evaluate progress toward meeting project objectives and to support adaptive management of the restoration project, as needed. Where applicable, it identifies key sources of uncertainty andincorporates monitoring data and decision points that address these uncertainties. As not all projects would have the same sources and degree of

uncertainty, this project-specific MAM plan is scaled according to level of uncertainty, scope, scale, and Restoration Type associated with this project.

This MAM plan is a living document and may be updated as needed to reflect changing conditions and/or new information. Any future revisions to this document would be made publicly available through the DIVER Portal (https://www.diver.orr.noaa.gov/web/guest/home) and accessible through the Trustee Council's website (https://www.habitat.noaa.gov/storymap/dwh/).

1.1 Project Overview

The project is being implemented to improve water quality impacts in the Mississippi Sound through nutrient load reduction in a coastal urban setting. This would be accomplished by directing and treating nutrient laden flows from existing ditches to a constructed, nature-based stormwater park and reforestation of a portion of a nearby municipal park.

This nutrient reduction project restores injury to water quality caused by the Deepwater Horizon (DWH) oil spill, consistent with the Programmatic Damage Assessment and Restoration Plan and Programmatic Environmental Impact Statement (PDARP/PEIS).

Programmatic Goal: Restore Water Quality
Restoration Type: Nutrient Reduction (Nonpoint Source)
Restoration Approach: Reduce nutrient loads to coastal watersheds and reduce pollution and hydrologic degradation to coastal watersheds
Restoration Techniques: Forestry management practices; low-impact development (LID) practices; and implement traditional stormwater control measures (SCM)
TIG: Mississippi Trustee Implementation Group (MS TIG)
Restoration Plan: Mississippi Trustee Implementation Group Restoration Plan 5

The project will directly address nutrient loading in Moss Point, Mississippi through the construction of co-located hydrologic and stormwater system enhancements. The two components are:

First Street Stormwater Park: Stormwater parks and other nature-based solutions (NbS) can be an effective means of reducing runoff in urban areas and serve as an important complement to existing stormwater systems. The design will include upgrading stormwater infrastructure to direct water flow from existing ditches to the stormwater park in order to reduce nutrient pollution in coastal streams that lead to the Mississippi Sound. A shallow infiltration basin/landscape that includes native plantings (woody and herbaceous plants) would be constructed to capture stormwater, allowing significant time for infiltration and nutrient reduction. Ponding is expected to be limited and temporary and would occur primarily during rain events and for brief periods after storm events. Stormwater would infiltrate and saturate soils similar to a seasonal inundated/saturated wetland landscape. The park would be designed with adequate capacity to handle common storm events (e.g. 1 to 3 year storm events). For storms that produce stormwater volumes at rates

that exceed the capacity of the basin, overflow would be directed to the municipal stormwater system.

In addition to the naturalized detention landscape designed to temporarily hold and filter runoff, the project would also include pervious parking spaces to promote infiltration.

Khayat Park Reforestation: The reforestation effort would increase water infiltration and evapotranspiration in the project area prior to stormwater entering coastal streams that drain to the Mississippi Sound. Native vegetation would be planted in the area including a mixture of small, medium, and large trees as well as native shrubs. Additionally, the project would result in construction of a bioswale in the park that would filter stormwater and promote native wetland plants.

1.2 Restoration Type Goals and Project Restoration Objectives

The overall goal for this Restoration Type relevant to this project, as identified in the PDARP/PEIS, are:

Goal 1: Reduce nutrient loadings to Gulf Coast estuaries, habitats, and resources that are threatened by chronic eutrophication, hypoxia, or harmful algal blooms or that suffer habitat losses associated with water quality degradation.

The project restoration objective is:

Objective 1:

- Improve water quality in the Mississippi Sound through nutrient load reduction in a coastal urban setting. The restoration objective is to reduce phosphorus, nitrogen, and sediment loads during storm events leaving project areas in Moss Point, MS

Performance criteria would be used to determine restoration success or the need for corrective action inaccordance with 15 C.F.R. 990.55(b)(1)(vii)). Specific, measurable performance criteria are defined, as applicable, for monitoring parameters associated with each of the restoration objectives in Section 3.0.

2.0 Adaptive Management

To increase the likelihood of achieving the project objective, MDEQ would conduct targeted monitoring and use the monitoring data to refine, as necessary, future management actions.

3.0 Project Monitoring, Performance Criteria, and Potential Corrective Actions

The monitoring plan for this restoration project was developed to evaluate project performance, key uncertainties, and potential corrective actions, if needed.

Information on each monitoring parameter is provided below and is organized by objective. The list of corrective actions provided below is not exhaustive; rather, it includes a list of potential actions to be considered if the project is not performing as expected once implemented. Other corrective actions maybe identified post-implementation, as appropriate.

Objective 1: Improve water quality in the Mississippi Sound through nutrient load reduction in a coastal urban setting. The restoration objective is to reduce phosphorus, nitrogen, and sediment loads during storm events leaving project areas in Moss Point, MS.

Table 3-1 Monitoring Parameters

Monitoring Parameter	Purpose	Method	Timing, Frequency, Duration	Sample Size and Sites	Performance Criteria	Potential Corrective Action(s)
First Street Stormwater Park						
Area	Performance Criterion	Final Inspection	Once, at Year 0	N/A	Constructed as designed	Complete the project as designed
Water Quality: Calculate approximate nutrient reduction benefits	Performance Criterion	TBD (site-specific modeling)	Modeling would be performed at years 2 and 3.	N/A	TBD,.*e.g., reduction of* suspended sediments trapped from treatment site; *reduction* of phosphorus trapped from treatment site, reduction of nitrogen trapped from treatment site	N/A
Khayat Park Reforestation						
Area	Performance Criterion	*Final Inspection*	Once, at Year 0	N/A	Constructed as designed	Complete the project as designed

4.0 Monitoring Schedule

The schedule for project performance monitoring is shown in Table 4-1 by monitoring parameter.

Table 4-1 Monitoring Schedule

Monitoring Parameter/Data	Pre-Construction Monitoring	Year 0 (As Built)	Year 1	Year 2	Year 3
Water Quality: model run to estimate approximate nutrient reduction		X		X	X
Conservation Improvements, Water Quality (Number Implemented by Activity)		X	X	X	X

5.0 Evaluation

The MS TIG anticipates conducting an evaluation of the monitoring data collected (as described above) to help answer the following questions:

Were the project restoration objectives achieved? If not, is there a reason why they were not met?

Were there unanticipated events unrelated to the restoration project that potentially affected the monitoring results (e.g., hurricanes)?

6.0 Data Management

6.1 Data Description

Data will be compiled within 12 months after collection. To the extent practicable, data generated during monitoring activities would be documented using standardized field datasheets. If standardized datasheets are unavailable, then project-specific datasheets would be drafted prior to conducting any project monitoring activities. Original datasheets, notebooks and photographs will be retained by MDEQ in accordance with MDEQ record retention policy.

Relevant project data that are handwritten on hardcopy datasheets or notebooks would be transcribed (entered) into standard digital format as appropriate per protocols developed by MDEQ. 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 Federal Geographic Data Committee/International Organization for Standardization (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 was collected, Quality Assurance/Quality Control (QA/QC) procedures, other information about data such as meaning, relationships to other data, origin, usage, and format).

6.2 Data Review and Clearance

After transcription of the data, the electronic datasheets will be verified against the original hardcopy datasheets and/or notebooks. Any corrections needed will be made to transcription errors before data are used for any analyses or distributed outside of the agency. MDEQ will verify and validate MAM data and information and would ensure that all data are: i) entered or converted into agreed upon/commonly used digital format; ii) labeled with metadata following FGDC/ISO standards to the extent practicable and in accordance with MDEQ requirements.

After identified errors are addressed, data are QA/QC'ed. MDEQ will give the other MS TIG members time to review the data before making such information publicly available (as described below).

6.3 Data Storage and Accessibility

Once all data has been QA/QC'ed it will be stored on MDEQ servers. MDEQ will provide DWH NRDA MAM data and information to DIVER as soon as possible and no more than 1 year from when data are collected.

6.4 Data Sharing

Data will be made publicly available, in accordance with the Open, Public, Electronic and NecessaryGovernment Data Act of 2019, through the DIVER Explorer Interface within 1 year of when the data collection occurred.

7.0 Reporting

All reporting will occur after field surveys are completed annually. This report will summarize the findings for the sampling period including all worksheets transferred into digital format and presented intabular and graphical formats. The data should be summarized in such a way that it is meaningful to the reader. Additionally, an annual report would be completed that includes:

Summary data –synthesized data for all efforts during the year.
Graphics, if applicable, and associated interpretations of the data.
Comparisons of pre- and post-project conditions, as applicable.
Any uncertainties with management actions.
Potential data collection issues.
Reporting on general MAM activities in the DIVER Restoration Portal on an annual basis.
Developing a Final MAM Report before a project is closed out.

8.0 Roles and Responsibilities

The MS TIG is responsible for addressing MAM objectives that pertain to their restoration activities and for communicating information to the public through DIVER. The Implementing Trustee for the project is MDEQ. MDEQ's roles include coordination with the MS TIG to track project progress, program management and oversight, monitoring oversight, data management, and reporting.

B1, Lower Mississippi River Valley Migratory Bird Habitat Enhancement: Monitoring and Adaptive Management Plan

Table of Contents

1.0 Introduction

This project monitoring and adaptive management (MAM) plan identifies the monitoring needed to evaluate progress toward meeting project objectives and to support adaptive management of the restoration project, as needed. Where applicable, it identifies key sources of uncertainty andincorporates monitoring data and decision points that address these uncertainties. As not all projects would have the same sources and degree of uncertainty, this project-specific MAM plan is scaled according to level of uncertainty, scope, scale, and Restoration Type associated with this project.

This MAM plan is a living document and may be updated as needed to reflect changing conditions and/or new information. Any future revisions to this document would be made publicly available through the Restoration Portal.

1.1 Project Overview

This project is being implemented to restore for birds injured by the Deepwater Horizon (DWH) oil spill, consistent with the ProgrammaticDamage Assessment and Restoration Plan and Programmatic Environmental Impact Statement (PDARP/PEIS).

- Programmatic Goal: Replenish and Protect Living Coastal and Marine Resources
- Restoration Type: Birds
- Restoration Approach: Restore and Conserve Bird Nesting and Foraging Habitat
- Increase availability of foraging habitat at inlands, managed moist-soil impoundments, agricultural fields, and aquaculture ponds
- TIG: Mississippi Trustee Implementation Group (MS TIG)
- Restoration Plan: Mississippi Trustee Implementation Group Restoration Plan 5

This project would enhance and actively manage existing wetland management units in multiple National Wildlife Refuges (NWRs) and Wildlife Management Areas (WMAs) in the Lower Mississippi River Valley (LMRV), to restore/improve habitat conditions to benefit multiple species of migratory birds that were injured by the 2010 DWH oil spill.

1.2 Restoration Type Goals and Project Restoration Objectives

The overall goals for this Restoration Type relevant to this project, as identified in the PDARP/PEIS, are:

Restore lost birds 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.

The project restoration objectives are:

Increase shallow-water habitat within the project areas to meet or exceed the foraging requirements of shorebirds, wading birds, and waterfowl during migration.

Benefit populations of these species as demonstrated by greater overwinter survival and increased breeding success the following year.

Performance criteria would be used to determine restoration success or the need for corrective action inaccordance with 15 Code of Federal Records 990.55(b)(1)(vii)). Specific, measurable performance criteria will be defined, as applicable, for potential monitoring parameters associated with each of the restoration objectives in Section 3.0.

2.0 Adaptive Management

To increase the likelihood of achieving the project objective, the Implementing Trustees would conduct targeted monitoring and use the monitoring data to refine future management actions. The project would apply similar restoration techniques previously applied in Mississippi to increase shallow-water habitat within the project areas to meet or exceed the foraging requirements of shorebirds, wading birds, and waterfowl during their migration. Data collected on bird abundance would be a fundamental monitoring parameter for the project. These data would inform adaptive management during implementation and future restoration planning, such as adjusting the types and amount of effort invested in certain locations to improve bird habitat conservation and enhancement activities.

3.0 Project Monitoring, Performance Criteria, and Potential Corrective Actions

The monitoring plan for this restoration project was developed to evaluate project performance, key uncertainties, and potential corrective actions, and could be updated in the future if necessary.

Information on each monitoring parameter is provided below and organized by objective. The list of corrective actions provided below is not exhaustive; rather, it includes a list of potential actions to be considered if the project is not performing as expected once implemented. Other corrective actions may be identified post-implementation, as appropriate. The tables below provide objectives and associated monitoring parameters relevant for target species and their habitats, as well as details of data collection activities associated with conducting potential project activities.

Objective 1: Enhance and actively manage wetland managements units to increase shallow-water habitat within the project areas to meet or exceed the foraging requirements of shorebirds, wading birds, and waterfowl during migration.

Monitoring Parameters	Method	Timing & Frequency of Data Collection	Sample Size/Sites	Performance Criteria	Potential Corrective Action(s)
Conservation Improvements, Birds	Document acres of habitat managed/improved	Documentation after construction is concluded at each site	All restored sites	Increased acres of migratory bird dependent habitat to benefit bird species.	Implement maintenance measures as necessary to address any impaired or failing impoundment improvements (e.g., regrading of levees)

Objective 2: Benefit populations of these species as demonstrated by greater overwinter survival and increased breeding success the following year.

Monitoring Parameters	Method	Timing & Frequency of Data Collection	Sample Size/Sites	Performance Criteria	Potential Corrective Action(s)
Abundance, Birds Density, Birds	The sampling design would follow a paired design approach of restoration and reference (i.e., unrestored impoundments or inundated agricultural fields) impoundments. During sampling, a single observer arriving at the impoundment would visit a pre-determined, GPS-marked vantage point and record all waterfowl, wading birds, and shorebirds using spotting scopes and binoculars. For wetlands too large to see from a single vantage point, sampling would either occur from more than one vantage point, or a randomly selected portion of the impoundment would be sampled. Birds would be counted individually or grouped systematically (e.g., groups of 10), then the bird counts would be extrapolated to whole flock total bird abundance.	Sampling is anticipated to occur from late winter to spring and late summer to fall to cover migration pulses. There would be four (4) sampling periods per season. Among all sampling periods, site order and start times will be randomized to avoid sampling bias and account for temporal occupancy of species among sites. Additionally, monitoring periods may be dependent on the timing of restoration activities across all sites.	TBD – based on construction activities per site. Restoration sites would include single or clustered impoundments receiving restoration treatments described for this project such as levee reconstruction, installation of new water control structures, and associated earth work. Once the impoundments to receive restoration are identified, associated reference impoundments for both unrestored areas and inundated agricultural fields would be located and matched for avian surveys.	Increase in bird species abundance	Adjust depth and timing of flooding events as necessary to maximize use of sites during bird migration through precise control of hydrology and manipulation of plant succession,

4.0 Monitoring Schedule

Monitoring will run concurrent to project activities, which will be implemented over seven (7) years. Performance monitoring on each activity will occur for three years and will overlap with implementation. The table below describes the monitoring schedule for all parameters during the implementation cycle.

Monitoring Parameters	Planning (Year 0) 2027	Year 1 2028	Year 2 2029	Year 3 2030	Year 4 2031	Year 5 2032	Year 6 2033
Conservation Improvements, Birds	X	X	X	X	X	X	X
Abundance, Birds Density, Birds	X	X	X	X	X	X	X

5.0 Evaluation

The MS TIG anticipates conducting an evaluation of the monitoring data collected (as described above) to help answer the following questions:

Were the project restoration objectives achieved? If not, is there a reason why they were not met?

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?

6.0 Data Management

6.1 Data Description

Data would be compiled within 12 months after collection. To the extent practicable, data generated during monitoring activities would be documented using standardized field datasheets. If standardized datasheets are unavailable, then project-specific datasheets would be drafted prior to conducting any project monitoring activities. Original datasheets and notebooks and photographs would be retained by the implementing Trustees.

Relevant project data that are handwritten on hardcopy datasheets or notebooks would be transcribed (entered) into standard digital format as appropriate per protocols developed by the Implementing Trustee. 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 would have properly documented Federal Geographic Data Committee/International Organization for Standardization (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 was collected, Quality Assurance/Quality Control (QA/QC) procedures, other information about data such as meaning, relationships to other data, origin, usage, and format).

6.2 Data Review and Clearance

After transcription of the data, the electronic datasheets would be verified against the original hardcopy datasheets and/or notebooks and would make any correctionsto transcription errors as appropriate before data are used for any analyses or distributed outside of theagency. Implementing Trustees would verify and validate MAM data and information and would ensure that all data are: i) entered or converted into agreed upon/commonly used digital format; ii) 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 QA/QC'ed. The Implementing Trustees would give the other MS TIG members time to review the data before making such information publicly available (as described below).

6.3 Data Storage and Accessibility

Once all data has been QA/QC'ed, it would be stored on MDEQ servers. Trustees would provide DWH NRDA MAM data and information to DIVER as soon as possible and no more than 1 year from when data are collected.

6.4 Data Sharing

Data would be made publicly available, in accordance with the Open, Public, Electronic and NecessaryGovernment Data Act of 2019, through the DIVER Explorer Interface within 1 year of when the data collection occurred.

7.0 Reporting

All reporting would occur after field surveys are completed annually. This report would summarize the findings for the sampling period including all worksheets transferred into digital format and presented intabular and graphical formats. The data should be summarized in such a way that it is meaningful to the reader. Additionally, an annual report would be completed that includes:

Summary data – synthesized data for all efforts during the year.
Graphics, if applicable, and associated interpretations of the data.
Comparisons of pre- and post-project conditions, as applicable.
Any uncertainties with management actions.
Potential data collection issues.

Reporting on general MAM activities in the DIVER Restoration Portal on an annual basis.

Developing a Final MAM Report before a project is closed out.

8.0 Roles and Responsibilities

The MS TIG is responsible for addressing MAM objectives that pertain to their restoration activities and for communicating information to the public through DIVER. The Implementing Trustees for the project would be DOI and MDEQ. DOI and MDEQ roles include coordination with contractors and volunteers and the MS TIG to track project progress, program management and oversight, monitoring oversight.

Birds2, Restoration of Shorebird Habitat on Cat Island, MS

Table of Contents

1.0 Introduction

This project monitoring and adaptive management (MAM) plan identifies the monitoring needed to evaluate progress toward meeting project objectives and to support adaptive management of the restoration project, as needed. Where applicable, it identifies key sources of uncertainty andincorporates monitoring data and decision points that address these uncertainties. As not all projects would have the same sources and degree of uncertainty, this project-specific MAM plan is scaled according to level of uncertainty, scope, scale, and Restoration Type associated with this project.

This MAM plan is a living document and may be updated as needed to reflect changing conditions and/or new information. Any future revisions to this document would be made publicly available through the Restoration Portal.

1.1 Project Overview

This project is being implemented to restore for birds injured by the Deepwater Horizon (DWH) oil spill, consistent with the Programmatic Damage Assessment and Restoration Plan and Programmatic Environmental Impact Statement (PDARP/PEIS).

- Programmatic Goal: Replenish and Protect Living Coastal and Marine Resources
- Restoration Type: Birds
- Restoration Approaches: Restore and Conserve Bird Nesting and Foraging Habitat
- Restoration Techniques; Restore and Enhance Dunes and Beaches; Create, Restore, and Enhance Barrier and Coastal Islands and Headlands
- TIG: Mississippi Trustee Implementation Group (MS TIG)
- Restoration Plan: Mississippi Trustee Implementation Group Restoration Plan 5

This project would restore beach/dune habitat on the northeast part of Cat Island, Harrison County, MS, to provide nesting and foraging opportunities for Mississippi's shorebird population. It would restore the historical footprint of the northeastern portion of the island to an area approximate to habitats that existed in the early 1900s, totaling up to approximately 100 acres of additional bird habitat.

1.2 Restoration Type Goals and Project Restoration Objectives

The overall goals for this Restoration Type relevant to this project, as identified in the PDARP/PEIS, are:

Restore lost birds 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.

The project restoration objective is:

Restore beach and dune habitat for shorebirds on Cat Island through the dredging and placement of sand resources along the northeastern tip of Cat Island that is similar to existing shoreline habitat.

Performance criteria would be used to determine restoration success or the need for corrective action inaccordance with 15 Code of Federal Records 990.55(b)(1)(vii)). Specific, measurable performance criteria will be defined, as applicable, for potential monitoring parameters associated with each of the restoration objectives in Section 3.0.

2.0 Adaptive Management

To increase the likelihood of achieving the project objective, the Implementing Trustee would conduct targeted monitoring and use the monitoring data to refine future

management actions. The project would apply consistent restoration techniques previously applied in Mississippi to directly address habitat loss and degradation stressors that impact birds. Data collected on bird abundance and species richness and diversity would be fundamental monitoring parameters for the project. These data would inform adaptive management during implementation and future restoration planning, such as adjusting the types and amount of effort invested in certain locations to improve bird habitat conservation and enhancement activities.

3.0 Project Monitoring, Performance Criteria, and Potential Corrective Actions

The monitoring plan for this restoration project was developed to evaluate project performance, key uncertainties, and potential corrective actions, and could be updated in the future if necessary

Information on each monitoring parameter is provided below and organized by objective. The list of corrective actions provided below is not exhaustive; rather, it includes a list of potential actions to be considered if the project is not performing as expected once implemented. Other corrective actions may be identified post-implementation, as appropriate. The tables below provide objectives and associated monitoring parameters relevant for target species and their habitats, as well as details of data collection activities associated with conducting potential project activities.

Objective 1: Restore beach and dune habitat for shorebirds on Cat Island through the dredging and placement of sand resources along the northeastern tip of Cat Island that is similar to existing shoreline habitat.

Monitoring Parameters	Method	Timing & Frequency of Data Collection	Sample Size/Sites	Performance Criteria	Potential Corrective Action(s)
Area	Document acres of habitat created/improved	Year 0 (construction complete	Project footprint	Constructed as designed	
Abundance, Birds	Census sampling within the restoration area to record all shorebirds. Birds would be counted individually or grouped systematically. Transect surveys in the total project area would occur during early breeding season and in winter.	Baseline pre-construction, then for three years after construction. Surveys would occur approximately once every 7-10 days when feasible during early breeding season and in winter for	TBD/In the construction project area; For breeding season surveys, focal sites would be determined once colonies have formed.	Increase in bird abundance in restored area	Could include activities such as regrading, planting vegetation

Monitoring Parameters	Method	Timing & Frequency of Data Collection	Sample Size/Sites	Performance Criteria	Potential Corrective Action(s)
	Individual breeding colonies would be surveyed during peak breeding season.	solitary shorebirds. During peak breeding season, survey once weekly at breeding focal sites.			

4.0 Monitoring Schedule

Monitoring will begin prior to construction with a baseline bird survey and physical pre-construction survey, a post-construction survey when construction is complete, and annual bird surveys for three years. The table below describes the monitoring schedule for all parameters during the implementation cycle.

Monitoring Schedule

Monitoring Parameters/Data	Pre-Construction Monitoring	Construction Monitoring (initial)			
	2029	2030-As-built (Year 0)	2031	2032	2033
Objective 1: Area	X	X			
Objective 2: Abundance of Shorebirds by Species	X		X	X	X

5.0 Evaluation

The MS TIG anticipates conducting an evaluation of the monitoring data collected (as described above) to help answer the following questions:

Were the project restoration objectives achieved? If not, is there a reason why they were not met?

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?

6.0 Data Management

6.1 Data Description

Data would be compiled within 12 months after collection. To the extent practicable, data generated during monitoring activities would be documented using standardized field datasheets. If standardized datasheets are unavailable, then project-specific datasheets would be drafted prior to conducting any project monitoring activities. Original datasheets and notebooks and photographs would be retained by the implementing Trustees.

Relevant project data that are handwritten on hardcopy datasheets or notebooks would be transcribed (entered) into standard digital format as appropriate per protocols developed by the Implementing Trustee. 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 would have properly documented Federal Geographic Data Committee/International Organization for Standardization (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 was collected, Quality Assurance/Quality Control (QA/QC) procedures, other information about data such as meaning, relationships to other data, origin, usage, and format).

6.2 Data Review and Clearance

After transcription of the data, the electronic data sheets would be verified against the original hardcopy datasheets and/or notebooks and would make any corrections to transcription errors as appropriate before data are used for any analyses or distributed outside of theagency. Implementing Trustees would verify and validate MAM data and information and would ensure that all data are: i) entered or converted into agreed upon/commonly used digital format; ii) 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 QA/QC'ed. The Implementing Trustees would give the other MS TIG members time to review the data before making such information publicly available (as described below).

6.3 Data Storage and Accessibility

Once all data has been QA/QC'ed, it would be stored on Mississippi Department of Environmental Quality servers. Trustees would provide DWH NRDA MAM data and information to DIVER as soon as possible and no more than 1 year from when data are collected.

6.4 Data Sharing

Data would be made publicly available, in accordance with the Open, Public, Electronic and NecessaryGovernment Data Act of 2019, through the DIVER Explorer Interface within 1 year of when the data collection occurred.

7.0 Reporting

All reporting would occur after field surveys are completed annually. This report would summarize the findings for the sampling period including all worksheets transferred into digital format and presented intabular and graphical formats. The data should be summarized in such a way that it is meaningful to the reader. Additionally, an annual report would be completed that includes:

Summary data –synthesized data for all efforts during the year.
Graphics, if applicable, and associated interpretations of the data.
Comparisons of pre- and post-project conditions, as applicable.
Any uncertainties with management actions.
Potential data collection issues.
Reporting on general MAM activities in the DIVER Restoration Portal on an annual basis.
Developing a Final MAM Report before a project is closed out.

8.0 Roles and Responsibilities

The MS TIG is responsible for addressing MAM objectives that pertain to their restoration activities and for communicating information to the public through DIVER. The Implementing Trustee for the project would be MDEQ. MDEQ's roles include coordination with contractors and volunteers and the MS TIG to track project progress, program management and oversight, monitoring oversight.

Appendix B

PDARP/PEIS Impact Intensity Definition Table

Resource	Impact Duration	Minor Intensity	Moderate Intensity	Major Intensity
Geology and Substrates	Short-term: During construction period. Long-term: Over the life of the project or longer.	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 on 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 on 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	Short-term: During construction period. Long-term: Over the life of the project or longer.	Hydrology: 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 groundwater flows. Water quality: 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.	Hydrology: 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 groundwater flows. Water quality: Impacts on 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	Hydrology: The effect on hydrology could be measurable and widespread. The effect could permanently alter hydrologic patterns including surface and groundwater flows. Water quality: 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

Resource	Impact Duration	Minor Intensity	Moderate Intensity	Major Intensity
		State water quality standards as required by the Clean Water Act could not be exceeded. Floodplains: 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. Wetlands: 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 connectivity could occur; however, wetland function could not be affected and natural restoration could occur if left alone.	standards as required by the Clean Water Act. Floodplains: 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. Wetlands: 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.	impair designated uses of a waterbody. Floodplains: 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. Wetlands: 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.
Air Quality	Short-term: During construction period.	The impact on air quality may be measurable but could be localized	The impact on air quality could be measurable and limited to local and	The impact on air quality could be measurable over a widespread

Resource	Impact Duration	Minor Intensity	Moderate Intensity	Major Intensity
	Long-term: Over the life of the project or longer.	and temporary, such that the emissions do not exceed USEPA's *de minimis* criteria for a general conformity determination under the Clean Air Act (40 CFR 93.153).	adjacent areas. Emissions of criteria pollutants could be at USEPA's *de minimis* criteria levels for general conformity determination.	area. Emissions would be high, such that they could exceed USEPA's *de minimis* criteria for a general conformity determination.
Noise	Short-term: During construction period. Long-term: 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.
Habitats	Short-term: Lasting less than two growing seasons. Long-term: 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	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 adversely affect local populations 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.	Impacts on native vegetation could be measurable and widespread. Frequent disturbances of individual plants could be expected, with adverse impacts on both local and regional population levels. These disturbances could adversely affect range-wide population stability. Some impacts might occur in key habitats, and habitat impacts could adversely affect the viability

Resource	Impact Duration	Minor Intensity	Moderate Intensity	Major Intensity
		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 temporary and localized and could not displace native species populations and distributions.	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.	of the species both locally and throughout its range. Actions could result in the widespread increase of non-native species and result in broad and permanent changes to native species populations and distributions.
Wildlife Species (including birds)	Short-term: Lasting up to two breeding seasons, depending on length of breeding season. Long-term: Lasting more than two breeding seasons.	Impacts on 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	Impacts on native species, their habitats, or the natural processes sustaining them could be measurable but limited to local and adjacent areas. Occasional responses to disturbance by some individuals could be expected, with some adverse impacts on 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. Opportunity for increased spread of	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 adverse impacts on 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

Resource	Impact Duration	Minor Intensity	Moderate Intensity	Major Intensity
		demographic factors could occur. Sufficient habitat could remain functional at both the local and range-wide scales to maintain the viability of the species. 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.	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.	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. Actions could result in the widespread increase of non-native species and result in broad and permanent changes to native species populations and distributions.
Marine and Estuarine Fauna (fish, shellfish, benthic organisms)	Short-term: Lasting up to two spawning seasons, depending on length of season. Long-term: Lasting more than two spawning seasons.	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	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.	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.

Resource	Impact Duration	Minor Intensity	Moderate Intensity	Major Intensity
		spawning. There could be no restriction of movements daily or seasonally. 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.	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.	Species movements could be seasonally constrained or eliminated. Actions could result in the widespread increase of non-native species and result in broad and permanent changes to native species populations and distributions.

Resource	Impact Duration	Minor Intensity	Moderate Intensity	Major Intensity
Protected Species	Short-term: Lasting up to one breeding/growing season. Long-term: Lasting more than one breeding/ growing season.	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.
Socioeconomics and	Short-term: During	A few individuals, groups, businesses,	Many individuals, groups, businesses, properties, or	A large number of individuals, groups,

Resource	Impact Duration	Minor Intensity	Moderate Intensity	Major Intensity
Environmental Justice	construction period. Long-term: Over the life of the project or longer.	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. Actions could not disproportionately affect minority and low-income populations.	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. Actions could disproportionately affect minority and low-income populations. However, the impact could be temporary and localized.	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. Actions could disproportionately affect minority and low-income populations, and this impact could be permanent and widespread.
Cultural Resources	Short-term: During construction period. Long-term: Over the life of the project or longer.	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.	Disturbance of a site(s), building, structure, or object not expected to result in a substantial loss of important cultural information.	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.

Resource	Impact Duration	Minor Intensity	Moderate Intensity	Major Intensity
Infrastructure	Short-term: During construction period. Long-term: Over the life of the project or longer.	The action could affect public services or utilities, but the impact could be localized and within operational capacities. There could be negligible increases in local daily traffic volumes resulting in perceived inconvenience to drivers but no actual disruptions to traffic.	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. 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.	The action could affect public services or utilities over a widespread area resulting in the loss of certain services or necessary utilities. 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.
Land and Marine Management	Short-term: During construction period. Long-term: Over the life of the project or longer.	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.	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.	The action could cause permanent changes to and conflict with land uses or management plans over a widespread area.
Tourism and Recreational Use	Short-term: During construction period.	There could be partial developed recreational site closures to protect public safety. The same	There could be complete site closures to protect public safety. However, the sites could be reopened	All developed site capacity could be eliminated because developed facilities could be

Resource	Impact Duration	Minor Intensity	Moderate Intensity	Major Intensity
	Long-term: Over the life of the project or longer.	site capacity and visitor experience could remain unchanged after construction. 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. There could be a change in local recreational opportunities; however, it could affect relatively few visitors or could not affect any related recreational activities.	after activities occur. There could be slightly reduced site capacity. The visitor experience could be slightly changed but still available. 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.	closed and removed. Visitors could be displaced to facilities over a widespread area, and visitor experiences could no longer be available in many locations. 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.
Fisheries and Aquaculture	Short-term: Lasting up to two spawning seasons, depending on length of season. Long-term: Lasting more than two spawning seasons.	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	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.	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

Resource	Impact Duration	Minor Intensity	Moderate Intensity	Major Intensity
				economic conditions.
Marine Transportation	Short-term: During construction period. Long-term: Over the life of the project or longer.	The action could affect public services or utilities, but the impact could be localized and within operational capacities. There could be negligible increases in local daily marine traffic volumes, resulting in perceived inconvenience to operators but no actual disruptions to transportation.	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. 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).	The action could affect public services utilities over a widespread area resulting in the loss of certain services or necessary utilities. 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).
Aesthetics and Visual Resources	Short-term: During construction period. Long-term: Over the life of the project or longer.	There could be a change in the viewshed 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 viewshed 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	Short-term: During construction period. Long-term: Over the life of the project or longer.	Actions could not result in (1) soil, groundwater, and/or surface water contamination; (2) exposure of contaminated media to	Actions could result in (1) exposure, mobilization and/or migration of existing contaminated soil, groundwater, or surface water to an extent that requires mitigation; and/or (2)	Actions could result in (1) soil, groundwater, and/or surface water contamination at levels exceeding federal, state, or local hazardous

Resource	Impact Duration	Minor Intensity	Moderate Intensity	Major Intensity
		construction workers or transmission line operations personnel; and/or (3) mobilization and migration of contaminants currently in the soil, groundwater, or surface water at levels that could harm the workers or general public. 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.	could introduce detectable levels of contaminants to soil, groundwater, and/or surface water in localized areas within the project boundaries such that mitigation/remediation is required to restore the affected area to the pre-construction conditions. 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.	waste criteria, including those established by 40 CFR 261; (2) mobilization of contaminants currently in the soil, groundwater, 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, groundwater, 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 OSHA in 29 CFR 1910. 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

Resource	Impact Duration	Minor Intensity	Moderate Intensity	Major Intensity
				avoidance over a widespread area.