Mississippi Trustee Implementation Group

2016-2017 Restoration Plan/Environmental Assessment

Cover photo: A marsh site within Grand Bay

Photo courtesy of Rick Ranew of the Grand Bay National Estuarine Research Reserve

EXECUTIVE SUMMARY

On April 20, 2010, the Deepwater Horizon (*DWH*) mobile drilling unit exploded, caught fire, and eventually sank in the Gulf of Mexico, resulting in a massive release of oil and other substances from BP Exploration and Production Inc.'s Macondo well. Initial efforts to cap the well following the explosion were unsuccessful, and for 87 days after the explosion, the well continuously and uncontrollably discharged oil and natural gas into the northern Gulf of Mexico. Approximately 3.19 million barrels (134 million gallons) of oil were released into the ocean (*In re: Deepwater Horizon*, 77 F. Supp. 3d 500, 525 (E.D. LA 2015)), by far the largest offshore oil spill in the history of the United States. Oil spread from the deep ocean to the surface and nearshore environment across the northern Gulf of Mexico. 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 the environment. However, many of these response actions had collateral impacts on the environment. The oil and other substances released from the well in combination with the extensive response actions together make up the *DWH* Oil Spill.

As an oil pollution incident, the *DWH* Oil Spill was subject to the provisions of the Oil Pollution Act of 1990 (OPA), which addresses preventing, responding to, and paying for oil pollution incidents in navigable waters, adjoining shorelines, and the exclusive economic zone of the United States. The 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). Under the authority of OPA, a council of federal and state *DWH* Oil Spill Trustees (the Trustees) was established, on behalf of the public, to assess natural resource injuries resulting from the incident and work to make the environment and public whole for those injuries. As required under OPA, the Trustees conducted a natural resource damage assessment (NRDA) to:

- Assess the impacts of the *DWH* Oil Spill on natural resources in the Gulf of Mexico and the services those resources provide, and
- Determine the type and amount of restoration needed to compensate the public for these impacts.

Following the assessment, the Trustees determined that the injuries caused by the *DWH* Oil Spill could not be fully described at the level of a single species, a single habitat type, or a single region. Rather, the injuries affected such a wide array of linked resources over such an enormous area that the effects of the *DWH* Oil Spill must be described as constituting an ecosystem-level injury.

Given the broad ecological scope of the injuries, restoration planning requires a broad ecosystem perspective to restore the vast array of resources and services injured by the *DWH* Oil Spill. Thus, the Trustees proposed a comprehensive, integrated ecosystem restoration approach in their programmatic level restoration plan (the Programmatic Damage Assessment and Restoration Plan/Programmatic Environmental Impact Statement, or PDARP/PEIS) to guide and direct the massive restoration effort. The PDARP/PEIS includes a portfolio of Restoration Types that addresses the diverse suite of injuries that occurred at both regional and local scales, and is based on the following five overarching goals:

- Restore and conserve habitat;
- Restore water quality;

- Replenish and protect living coastal and marine resources;
- Provide and enhance recreational opportunities; and
- Provide for monitoring, adaptive management, and administrative oversight to support restoration implementation.

These five goals work both independently and together to restore injured resources and services.

Restoration Plan/Environmental Assessment

This document, the "Mississippi Trustee Implementation Group 2016-2017 Restoration Plan/Environmental Assessment" (RP/EA), was prepared by the Mississippi Trustee Implementation Group (MS TIG) pursuant to OPA and its related NRDA regulations, as well as the National Environmental Policy Act of 1969 (NEPA), and is consistent with the Trustees' findings in the PDARP/PEIS. The MS TIG includes one state trustee agency and four federal trustee agencies: the Mississippi Department of Environmental Quality (MDEQ); the United States Department of Commerce, represented by the National Oceanic and Atmospheric Administration (NOAA); the United States Department of the Interior (DOI), represented by the United States Fish and Wildlife Service (USFWS), the National Park Service (NPS), and the Bureau of Land Management (BLM); the United States Department of Agriculture (USDA); and the United States Environmental Protection Agency (EPA).

In accordance with the OPA regulations (15 C.F.R. § 990.53), the MS TIG developed a screening process to develop a reasonable range of alternatives that is evaluated in this RP/EA. This process included compiling project ideas and screening those ideas to identify projects intended to restore for the Wetlands, Coastal, and Nearshore Habitats (WCNH), Birds, and Nutrient Reduction (NR) (Nonpoint source) Restoration Types in Mississippi. The MS TIG Projects were then evaluated against the following:

- The Programmatic Trustee Goals outlined in the PDARP/PEIS for the WCNH, Birds, and NR (Nonpoint Source) Restoration Types;
- The restoration approaches and restoration techniques for these Restoration Types, as described and evaluated against the OPA criteria found in 15 C.F.R. § 990.54 in Appendix 5D of the PDARP/PEIS;
- The MS TIG goals and objectives developed as part of this RP/EA; and
- Additional considerations identified by the MS TIG.

The MS TIG considered over 1,100 project submissions. Development of the reasonable range of alternatives is described in Section 2.0 of this document. The NEPA analysis for the reasonable range of alternatives is described in Section 3.0 of this document.

In the draft RP/EA published December 27, 2016, the MS TIG proposed moving forward with three preferred alternatives/projects: Graveline Bay Land Acquisition and Management Project (WCNH and Birds); Grand Bay Land Acquisition and Habitat Management Project (WCNH and Birds) and; Upper Pascagoula Water Quality Enhancement Project (NR-Nonpoint Source). (See Table ES-2 and Figure ES-1.) Public comments were received for a 45 day period ending February 10, 2017. This RP/EA addresses those comments and continues to propose the same preferred alternatives/projects.

Table ES-2: Preferred Alternatives/Projects for this RP/EA.

Preferred Alternatives/Projects	PDARP/PEIS Restoration Goal and Restoration Type	Proposed Funding
Graveline Bay Land Acquisition and Management	Restore and Conserve Habitat: Wetlands, Coastal, and Nearshore Habitats Replenish and Protect Living Coastal and Marine Resources: Birds	$11,500,000
Grand Bay Land Acquisition and Habitat Management	Restore and Conserve Habitat: Wetlands, Coastal, and Nearshore Habitats Replenish and Protect Living Coastal and Marine Resources: Birds	$6,000,000
Upper Pascagoula River Water Quality Enhancement	Restore Water Quality: NR (Nonpoint Source)	$4,000,000

Graveline Bay Land Acquisition and Management: The project includes acquiring and managing up to 1,410 acres within the existing Graveline Bay Coastal Preserve and nearby privately and publicly owned lands in Jackson County, Mississippi. Land will be acquired from willing sellers. Restoration measures include invasive species management, mechanical clearing, chemical treatment, access restriction, road repair/removal, culvert placement and prescribed fire. Habitat to be acquired includes estuarine marsh, shoreline (beach) and other coastal riparian habitats which provide foraging, loafing and nesting for bird species that were injured in the *DWH* Oil Spill. Restoration measures would reduce the threat of development, directly enhance habitat, decrease habitat fragmentation and increase habitat connectivity to other large conservation parcels in the area. Protection of shoreline habitat from vehicle traffic would also enhance shorebird nesting success. The lead Implementing Trustee for the project would be MDEQ working with DOI as an Implementing Trustee.[1] DOI will also be the lead federal agency for conducting the environmental evaluation review for implementation. Trustee roles and responsibilities will be defined in accordance with the SOPs. The Mississippi Department of Marine Resources (MDMR) would be a project partner. The Monitoring and Adaptive Management Plan for the project is described in Section 5.0 of the document and included as Appendix D.

Grand Bay Land Acquisition and Habitat Management: The project includes acquiring up to 8,000 acres and managing up to 17,500 acres within the boundaries of the Grand Bay National Wildlife Refuge, Grand Bay National Estuarine Research Reserve and Grand Bay Savanna Coastal Preserve in Jackson County, Mississippi. Land would be acquired from willing sellers target habitats would be

[1] See PDARP Section 7.2.3; and Trustee Council Standard Operating Procedures for Implementation of the Natural Resource Restoration for the *Deepwater Horizon* (DWH) Oil Spill (SOP) Section 9.5.1.1.

enhanced (coastal marsh, beach, freshwater marsh, savannas and flatwoods, and forested freshwater scrub-shrub). Restoration measures include invasive species management, mechanical clearing, chemical treatment, and prescribed fire. The primary objective of coastal land acquisition and restoration is to protect important contiguous lands and waters in an effort to maximize efficiencies and effectiveness in restoring and managing those habitats for the benefit of coastal resources. MDEQ and DOI would be Implementing Trustees for the project. DOI will also be the lead federal agency for conducting the environmental evaluation review for implementation. MDMR would be a project partner. The Monitoring and Adaptive Management Plan for the project is described in Section 5.0 of the document and included as Appendix E.

Upper Pascagoula River Water Quality Enhancement: The primary goal of the project is water quality improvement through the development and implementation of conservation plans and practices to reduce nutrient and sediment runoff into coastal waters. The Chunky-Okatibbee watersheds were selected for the project based on sediment load contributions to coastal waters. The project would provide outreach and technical assistance to voluntary participants (landowners) to develop conservation plans within a 20,000-acre area. Conservation practices, especially those systems that avoid, control and trap nutrient and sediment losses, would be implemented on cropland, pasture/grassland, forestland, and associated agriculture land within the Chunky-Okatibbee watersheds. USDA would be the lead Implementing Trustee for the project working with other Trustees and with NRCS as a project partner. MDEQ and EPA will assist in monitoring the project. USDA will also be the lead federal agency for conducting the environmental evaluation review for implementation. The Monitoring and Adaptive Management Plan for the project is described in Section 5.0 of the document and included as Appendix F.

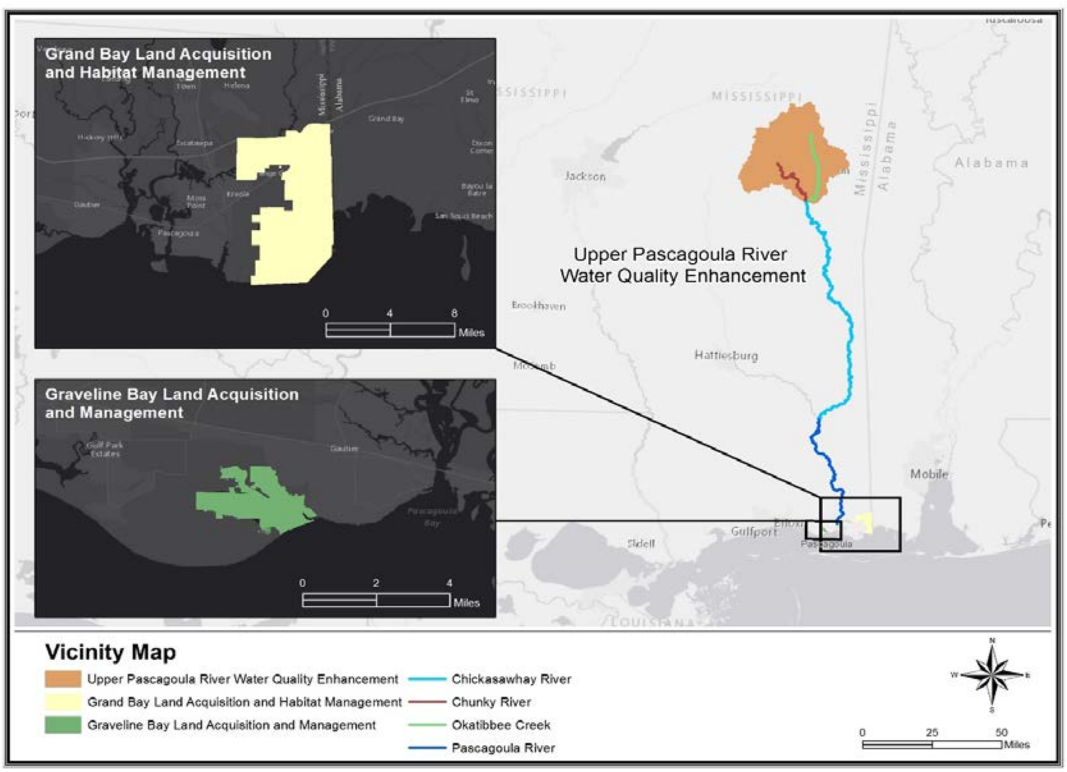

Figure ES-1: Locations of Preferred Proposed Alternatives.

Pursuant to NEPA, an evaluation of environmental consequences is discussed in the PDARP/PEIS and incorporated by reference into this RP/EA, and is also discussed in Section 3.0. Environmental consequences to the physical environment, the biological environment, and the socioeconomic environment are evaluated in this RP/EA (Section 3.3.1, 3.4.1, and 3.9.1). The findings are summarized below.

<u>WCNH and Birds Proposed Alternatives-Environmental Consequences Summary</u>

In addition to land acquisition, proposed habitat restoration measures and management activities for the proposed WCNH and Birds alternatives include prescribed fire and invasive species management through chemical treatment and/or mechanical treatment, access restriction, road repair/removal and culvert placement, and debris removal. Land acquisition and implementation of these restoration measures and management activities would have **short-term, minor, adverse impacts** to noise, tourism and recreation, and public health and safety. There would be **short-term, minor to moderate**, **adverse impacts** to hydrology, water quality, wetlands, air quality and greenhouse gases, habitat and wildlife from ground-disturbing activities associated with habitat restoration measures and management activities. Depending on the alternative, the adverse impacts to soils would range from **long-term, minor**, due to allowing public access on previously private land, to **short-term, minor to moderate** due to habitat management activities. Land acquisition could have a **short-term, minor to moderate adverse impact** on socioeconomic resources due to changes in visitor spending and loss of tax revenues. There would be a **long-term, minor to moderate**, adverse impacts to land and marine management.

There would be **long-term benefits** to soil, hydrology, floodplains, wetlands, water quality, habitat and wildlife, land and marine management, tourism and recreation, and public health and safety, due to preservation of habitats and floodplains, re-establishment of native plant communities, increased diversity in flora and fauna, implementation of existing resource management plans/initiatives, and the potential for increased visitor use.

<u>NR (Nonpoint Source) Proposed Alternative-Environmental Consequence Summary</u>

Ecological/NR conservation practices and soil and water conservation/NR practices with willing participants would provide a wide array of benefits to cropland, pasture/grassland, associated agriculture lands and riparian areas. There would be **short-term, minor to moderate**, adverse impacts to soils, water quality, wetlands and habitats and wildlife. The adverse impacts to hydrology would range from **long-term, minor**, due to conservation practices that may require in-stream work, to **short-term, minor to moderate** due to upland conservation practices. Conservation planning and the implementation of conservation practices on privately owned lands would reduce nutrient enrichment and sedimentation and restore water quality in Gulf of Mexico coastal watersheds. Conservation practices would provide **long-term benefits** to soil, hydrology, water quality and wetlands, habitat and wildlife, socioeconomic resources, and public health and safety.

NEXT STEPS

The MS TIG proposes to select three of the proposed preferred alternatives/projects for implementation: Graveline Bay Land Acquisition and Management; Grand Bay Land Acquisition and Habitat Management; and the Upper Pascagoula River Water Quality Enhancement project. After finalizing this RP/EA, a decision will be made whether a Finding of No Significant Impact (FONSI) is appropriate. After the NEPA process is complete, implementation of the projects, if approved, would be funded by a MS TIG resolution.

Table of Contents

1.0 Introduction

This "Mississippi Trustee Implementation Group 2016-2017 Restoration Plan/Environmental Assessment" (RP/EA) was prepared by the federal and state natural resource trustees for the Mississippi Trustee Implementation Group (MS TIG), which is responsible for restoring the natural resources and services in Mississippi that were injured by the April 20, 2010, Deepwater Horizon oil spill and associated spill response efforts (*DWH* Oil Spill). The purpose of restoration, as discussed in this document and detailed more fully in the Programmatic Damage Assessment and Restoration Plan/Programmatic Environmental Impact Statement (PDARP/PEIS), is to make the environment and the public whole for injuries resulting from the incident 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) and associated Natural Resource Damage Assessment (NRDA) regulations.

The MS TIG includes one state trustee agency and four federal trustee agencies: the Mississippi Department of Environmental Quality (MDEQ); the United States Department of Commerce, represented by the National Oceanic and Atmospheric Administration (NOAA); the United States Department of the Interior (DOI), represented by the United States Fish and Wildlife Service (USFWS), the National Park Service (NPS), and the Bureau of Land Management (BLM); the United States Department of Agriculture (USDA); and the United States Environmental Protection Agency (EPA).

1.1 Background and Summary of Settlement

On April 4, 2016, the United States District Court for the Eastern District of Louisiana entered a Consent Decree resolving civil claims by the *DWH* Oil Spill trustees (Trustees) against BP Exploration and Production Inc. (BP) arising from the *DWH* Oil Spill. This historic settlement resolved the Trustees' claims against BP for natural resource damages under OPA.

Under the Consent Decree, BP agreed to pay over a 15-year period a total of $8.1 billion in natural resource damages (which includes $1 billion that BP previously committed to pay for early restoration projects), and up to an additional $700 million (some of which is in the form of accrued interest) for adaptive management or to address injuries to natural resources that are presently unknown but may come to light in the future.

Table 1.1-1[2] outlines the settlement of NRDA claims; this table provides the final allocation for the MS Restoration Area under NRDA. The total NRDA funding for restoration in Mississippi is $295,557,000; the total remaining NRDA allocation for restoration in Mississippi (not including funds already allocated for early restoration projects) is $183 million.

[2] Table 1.1-1 is a modified version of Table 5.10-1 of the PDARP/PEIS.

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

Table 1.1-1: Settlement of NRD claims; NRD final allocation.

Major Restoration Categories	Mississippi
Wetlands, Coastal, and Nearshore Habitats	$55,500,000
Habitat Projects on Federally Managed Lands	$5,000,000
Early Restoration (through Phase IV)	$80,000,000
Nutrient Reduction (Nonpoint Source)	$27,500,000
Water Quality (e.g., Stormwater Treatments, Hydrologic Restoration, Reduction of Sedimentation, etc.)	0
Fish and Water Column Invertebrates	0
Early Restoration Fish and Water Column Invertebrates	0
Sturgeon	0
Sea Turtles	$5,000,000
Early Restoration Turtles	0
Submerged Aquatic Vegetation	0
Marine Mammals	$10,000,000
Birds	$25,000,000
Early Restoration Birds	0
Mesophotic and Deep Benthic Communities	0
Oysters	$20,000,000
Early Restoration Oysters	$13,600,000
Provide and Enhance Recreational Opportunities	$5,000,000
Early Restoration Recreational Opportunities	$18,957,000
Monitoring and Adaptive Management	$7,500,000
Administrative Oversight and Comprehensive Planning	$22,500,000
Adaptive Management NRD Payment for Unknown Conditions	0
Total NRD Funding	**$295,557,000**

1.2 *DWH* Oil Spill Trustees

As specified in OPA, natural resource trustees are designated to act on behalf of the public to assess and recover damages, develop implementation plans, and implement restoration plans (see Section 7.1 of the Final PDARP/PEIS for further detail). Trustees fulfill these responsibilities by developing restoration plans, providing the public with meaningful opportunities to review and comment on proposed plans (including the information that supports that purpose), implementing and monitoring restoration projects, managing natural resource damage funds, documenting trustee decisions through a public Administrative Record (including those that involve the use of recovered damages), and providing for public involvement and transparency in keeping with the public responsibilities with which they have each been entrusted under OPA.

The *DWH* Trustees are the government entities authorized under OPA to act as trustees on behalf of the public to assess natural resource injuries resulting from the *DWH* Oil Spill and develop and implement a restoration plan to compensate the public for those injuries. Collectively, these Trustees comprise the *DWH* Trustee Council. The following federal and state agencies are the designated Trustees under OPA for the *DWH* Oil Spill:

- U.S. Department of the Interior (DOI), represented by the U.S. Fish and Wildlife Service (USFWS), the National Park Service (NPS), and the Bureau of Land Management (BLM)
- National Oceanic and Atmospheric Administration (NOAA), on behalf of the U.S. Department of Commerce (DOC)
- U.S. Department of Agriculture (USDA)
- U.S. Department of Defense (DOD)[3]
- U.S. Environmental Protection Agency (EPA)
- The State of Alabama's Department of Conservation and Natural Resources (ADCNR) and Geological Survey of Alabama (GSA)
- The State of Florida's Department of Environmental Protection (FDEP) and Fish and Wildlife Conservation Commission (FWC)
- The State of Louisiana's Coastal Protection and Restoration Authority (CPRA) Department of Natural Resources (LDNR); Department of Environmental Quality (LDEQ); Oil Spill Coordinator's Office (LOSCO); and Department of Wildlife and Fisheries (LDWF)
- The State of Mississippi's Department of Environmental Quality (MDEQ)
- The State of Texas' Parks and Wildlife Department (TPWD), General Land Office (TGLO), and Commission on Environmental Quality (TCEQ)

Trustee Implementation Groups (TIGs) are established by the *DWH* Settlement agreement and are composed of Individual Trustee Agency representatives. The TIGs develop plans for, choose, and implement specific restoration actions under the Final PDARP/PEIS. Each TIG makes all restoration decisions for the funding allocated to its Restoration Area, and ensures its actions. The following state and federal agencies are the MS TIG:

- Mississippi Department of Environmental Quality
- U.S. Department of the Interior (DOI), represented by the U.S. Fish and Wildlife Service (USFWS), the National Park Service (NPS), and the Bureau of Land Management (BLM)
- National Oceanic and Atmospheric Administration (NOAA), on behalf of the U.S. Department of Commerce (DOC)

[3] Although a trustee under OPA by virtue of the proximity of its facilities to the *DWH* Oil Spill, DOD is not a member of the Trustee Council and does not participate in *DWH* Trustee decision-making.

- U.S. Department of Agriculture (USDA)
- U.S. Environmental Protection Agency (EPA)

1.3 Authorities and Regulations

1.3.1 OPA and NEPA Compliance

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

This process of injury assessment and restoration planning is referred to as NRDA. Under the authority of OPA, a council of federal and state trustees was established to assess natural resource injuries resulting from the *DWH* Oil Spill incident and to work to make the environment and public whole for those injuries. NRDA is described under Section 1006 of OPA (33 U.S.C. § 2706). Under the OPA NRDA regulations (15 C.F.R. Part 990), the NRDA process consists of three phases: 1) Preassessment; 2) Assessment and Restoration Planning; and 3) Restoration Implementation. The *DWH* Trustees are currently in the Restoration Implementation phase of the NRDA. As part of Restoration Implementation, this RP/EA identifies a reasonable range of restoration alternatives suitable for partially addressing the injuries caused by the *DWH* Oil Spill in Mississippi, evaluates those alternatives under various criteria, and proposes a suite of preferred alternatives to initiate post-settlement restoration for the Wetlands, Coastal, and Nearshore Habitats (WCNH), Birds, and Nutrient Reduction (Nonpoint Source) Restoration Types.

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

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

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

1.3.2 PDARP/PEIS Record of Decision

Given the potential magnitude and breadth of restoration for injuries resulting from the *DWH* Oil Spill, the Trustees prepared a PDARP/PEIS under OPA and NEPA to analyze alternative approaches to implementing restoration and to consistently guide restoration decisions. Based on the Trustees' thorough assessment of impacts to the Gulf's natural resources, a comprehensive, integrated ecosystem approach for restoration implementation was proposed. On February 19, 2016, the *DWH* Trustee Council issued a Final PDARP/PEIS detailing a specific proposed plan to fund and implement restoration projects. On March 29, 2016, in accordance with OPA and NEPA, the Trustees published a Notice of Availability of a Record of Decision (ROD) for the PDARP/PEIS in the Federal Register (81 Fed. Reg. 17438).[4] Based on the Trustees' injury determination established in the PDARP/PEIS, the ROD set forth the basis for the Trustees' decision to select Alternative A: Comprehensive Integrated Ecosystem Alternative. The Trustees' selection of Alternative A included the funding allocations established in the PDARP/PEIS.

More information about Alternative A can be found in Sections 5.5 and 5.10 of the PDARP/PEIS.

1.3.3 Relationship of this RP/EA to the PDARP/PEIS

As a programmatic restoration plan, the PDARP/PEIS provides direction and guidance for identifying, evaluating, and selecting future restoration projects to be carried out by the TIGs (PDARP/PEIS Section 5.10.4 and Chapter 7). The Trustees elected to prepare a PEIS to support analysis of the environmental consequences of the selected Restoration Types, to consider the multiple related actions that may occur because of restoration planning efforts, and to allow for a better analysis of cumulative impacts of potential actions. The programmatic approach was taken to assist the TIGs in their development and evaluation and to assist the public in its review of future restoration projects.

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

1) Wetlands, Coastal, and Nearshore Habitats (WCNH)
2) Habitat Projects on Federally Managed Lands
3) Nutrient Reduction (Nonpoint Source)
4) Water Quality (e.g., Stormwater Treatments, Hydrologic Restoration, Reduction of Sedimentation)
5) Fish and Water Column Invertebrates
6) Sturgeon

[4] Available at http://www.gulfspillrestoration.noaa.gov/sites/default/files/wp-content/uploads/PDARP_ROD_Final- with-All-Signatures508.pdf.

7) Submerged Aquatic Vegetation
8) Oysters
9) Sea Turtles
10) Marine Mammals
11) Birds
12) Mesophotic and Deep Benthic Communities
13) Provide and Enhance Recreational Opportunities

For this RP/EA, the MS TIG considered and evaluated proposed alternatives within the following Restoration Types: 1) WCNH; 2) Birds; and 3) Nutrient Reduction (NR) (Nonpoint Source), as described in Section 1.3.4 below. Section 2.0 of this RP/EA summarizes the injuries addressed and the screening process used to develop a reasonable range of alternatives. The reasonable range of alternatives is consistent with the Trustees' selected programmatic alternative in the PDARP/PEIS, the Consent Decree, and OPA. The MS TIG also prepared a NEPA analysis for each of the alternatives within the reasonable range (Section 3.0 of this document), which tiers from the PDARP/PEIS programmatic NEPA analysis.

1.3.4 Restoration Planning Context

In 2015, MDEQ began development of the Mississippi Gulf Coast Restoration plan (MGCRP),[5] which sets forth a coordinated, systematic, and transparent process for sustainable ecological restoration in Mississippi to restore injuries from the *DWH* Oil Spill.

MDEQ engaged stakeholders throughout the development of the first draft of the MGCRP. Numerous meetings were held with community and non-governmental organizations to share and highlight the individual organization's restoration priorities and objectives. MDEQ also held a series of Community Conversations to ascertain information on individual and organizational values, characteristics, and visions associated with coastal restoration. Utilizing the results of the Community Conversations, MDEQ hosted a series of Resource Summits aimed at a technical audience to provide information on Mississippi's planning tools as well as to refine the priorities identified by the public in earlier engagement efforts. The first draft of the MGCRP was released for public review and input in October 2015. MDEQ hosted a public webinar to present the MGCRP and solicit feedback for improvement.

The MGCRP included development of the Mississippi Comprehensive Ecosystem Restoration Tool (MCERT), a science-based tool that is now in place for identifying and examining ecological resources and threats for improved restoration planning and project sustainability. The MGCRP also includes the Decision Support System (DSS), which is a linear thought process that MDEQ utilizes to make informed, science-based decisions for enhancing, protecting, or restoring the ecological integrity of coastal Mississippi. The MCERT and the DSS are the tools which Mississippi utilizes in

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[5] Funded by the National Fish and Wildlife Foundation Gulf Environmental Benefit Fund. Available at http://www.restore.ms/mississippi-gulf-coast-restoration-plan/.

their comprehensive ecosystem approach to restoration project planning across *DWH* funding streams (National Fish and Wildlife Foundation Gulf Environmental Benefit Fund (NFWF GEBF), funding provided through the RESTORE Act, and *DWH* NRDA settlements). The MGCRP identified three general restoration program areas: Land Resources, Coastal and Marine Resources, and Water Resources. The MS TIG utilized the MGCRP and numerous other regional restoration and ecosystem management planning documents, as well as the MDEQ Restoration Project Idea portal and the Trustee Project Submission Portal, for the development of this RP/EA. Table 1.3-1 illustrates the common restoration themes in the MGCRP and the PDARP/PEIS. Section 2.4.4 provides a discussion of the relationship of the MGCRP program objectives and how they align with the PDARP/PEIS restoration goals and objectives.

Table 1.3-1: The Mississippi Gulf Coast Restoration Plan as Related to PDARP/PEIS Restoration Types.

The Mississippi Gulf Coast Restoration Plan; A Path Toward Sustainable Ecosystem Restoration	**PDARP/PEIS Restoration Types- May 27, 2016 Public Notification**			
Programs and Objectives	**Wetlands, Coastal, and NS Habitats**	**Birds**	**Oysters**	**Nutrient Reduction (Nonpoint Source)**
1. Land Resources Program				
Objective 1: Conserve Priority Habitats	X	X	-	X
Objective 2: Manage and Restore Priority Habitats	X	X	-	X
2. Coastal and Marine Resources Program				
Objective 1: Protect and Restore Marine Habitats[6]	X	-	X	-
Objective 2: Sustainably manage and enhance coastal and marine resource populations[7]	-	X	X	-
3. Water Resources Program				
Objective 1: Reduce rural Nonpoint Source pollution	-	-	-	X
Objective 2: Reduce urban Nonpoint Source pollution	-	-	-	X

On May 27, 2016, the MS TIG published a notice to invite public input regarding natural resource restoration opportunities in Mississippi for the 2016/2017 planning years. The notice indicated a focus on the following range of potential Restoration Types, which may have benefits to living coastal and marine resources:

[6] e.g., oyster reefs, submerged aquatic vegetation, interidal and subtidal habitats, and artificial reefs
[7] e.g., oysters, fish, birds, sea turtles, and marine mammals

- Restoration of WCNH;
- Restoration of water quality through NR (Nonpoint Source);
- Restoration of Birds; and
- Restoration of Oysters.

Because there are several ongoing or completed projects benefitting oysters and secondary productivity in Mississippi,[8] the MS TIG chose not to prioritize the Oysters Restoration Type in this RP/EA. However, oyster restoration projects will be considered in future MS TIG restoration plans.

On October 31, 2016, MDEQ published a Notice of Initiation for Restoration Plan Drafting in Mississippi, indicating an intention to focus on the following Restoration Types:

- WCNH;
- NR (Nonpoint Source); and
- Birds.

On December 27, 2016, the MS TIG published a Draft RP/EA. The public was encouraged to review and comment on the Draft RP/EA during a forty-five (45) day comment period. The MS TIG received submissions from private citizens, state and local agencies, and non-governmental organizations. The public comment period closed on February 10, 2017.

1.4 RP/EA

The MS TIG prepared this RP/EA in accordance with the PDARP/PEIS, the ROD, OPA, and NEPA. This RP/EA describes the *DWH* NRDA restoration planning process, identifies a reasonable range of restoration alternatives to address a portion of the injuries to resources and habitats caused by the *DWH* Oil Spill, and proposes from those alternatives a suite of preferred restoration alternatives for funding and implementation by the MS TIG. In accordance with the Trustee Council Standard Operating Procedures and 40 C.F.R. § 1501.5, the MS TIG designated USDA as the lead federal agency responsible for NEPA compliance for this RP/EA. NEPA authorizes a federal agency to adopt another agency's NEPA analysis provided that the analysis meets the standards for an adequate statement under the NEPA regulations (40 CFR § 1506.3). Further, a federal agency participating in the NEPA process as a cooperating agency may adopt the NEPA analysis of a lead agency without recirculating the statement when, after an independent review of the statement, the cooperating agency concludes that its comments and suggestions have been satisfied. NOAA, DOI, USEPA and state co-Trustees are participating in the development of the RP/EA as cooperating federal agencies pursuant to NEPA (40 CFR § 1508.5). There are no other cooperating federal, state, or local entities or Tribes.

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[8] Early Restoration Phase I Mississippi Artificial Reef Habitat and the Mississippi Oyster Cultch Restoration projects; Early Restoration Phase IV Restoring Living Shorelines and Reefs in Mississippi Estuaries project; and the NFWF Oyster Restoration and Management Phase I project

Upon completion of the RP/EA, each agency intends to independently determine if the EA component of the RP/EA is sufficient for the purposes of informing that agency's decision and hence adopt the EA in accordance with 40 CFR § 1506.3 and its agency-specific NEPA procedures. Adoption of the EA would be completed through signature on the final NEPA decision document.

1.5 Purpose and Need

To meet the purpose of restoring losses to natural resources and services injured as a result of the *DWH* Oil Spill, the MS TIG proposes to select the preferred alternatives/restoration projects evaluated in this RP/EA for implementation. This RP/EA is consistent with the PDARP/PEIS, which identifies extensive and complex injuries to natural resources and services across the Gulf of Mexico, as well as a need and plan for comprehensive restoration consistent with OPA. This RP/EA focuses on the restoration of injuries to natural resources and services in Mississippi, using funds made available in the *DWH* Consent Decree.

Section 5.3 of the PDARP/PEIS describes five Programmatic Trustee Goals for restoration work to benefit injured resources and services. The Programmatic Goals that would be addressed by the reasonable range of alternatives proposed in this RP/EA are:[9]

1) Restore and Conserve Habitat;
2) Restore Water Quality;
3) Replenish and Protect Living Coastal and Marine Resources; and
4) Provide for Monitoring, Adaptive Management, Administrative Oversight to Support Restoration Implementation.

To help meet these goals, this RP/EA the MS TIG addresses three Restoration Types: WCNH, Birds, and NR (Nonpoint Source). Consistent with the Programmatic Trustee Goals for restoration, the Trustees also developed specific goals to guide restoration planning and project selection for each Restoration Type[10] (PDARP/PEIS Sections 5.5.2 through 5.5.14). The specific goals of each Restoration Type selected by the MS TIG for focus in this RP/EA are also described in Section 2.4 of this RP/EA. Additional information about the Purpose and Need for *DWH* NRDA restoration can be found in Section 5.3.2 of the PDARP/PEIS at page 5-11.

[9] The fifth goal not addressed in this RP/EA is Provide and Enhance Recreational Opportunities.

[10] PDARP/PEIS Section 5.5.2.1 describes the goals for Restoration Type Wetlands, Coastal, and Nearshore Habitats, Section 5.5.4.1 describes the goals for Restoration Type Nutrient Reduction (Nonpoint Source), and Section 5.5.12.1 presents goals for the Restoration Type Birds.

1.6 Proposed Action: MS TIG 2016-2017 RP/EA

This RP/EA addresses the *DWH* Programmatic Trustee Goals for restoration discussed above by evaluating six action alternatives. These alternatives are intended to contribute to primary and compensatory restoration of habitats, species, and services in Mississippi. Given results of the evaluation, the MS TIG proposes to select the preferred restoration alternatives/projects summarized in Table 1.6-1. Project locations associated with these alternatives are shown in figure 1.6-1.

Table 1.6-1: Proposed Preferred Restoration Alternatives/Projects in this RP/EA.

Preferred Alternatives/Projects	PDARP/PEIS Restoration Goal and Restoration Type	Proposed Funding
Graveline Bay Land Acquisition and Management	Restore and Conserve Habitat: Wetlands, Coastal, and Nearshore Habitats Replenish and Protect Living Coastal and Marine Resources: Birds	$11,500,000
Grand Bay Land Acquisition and Habitat Management	Restore and Conserve Habitat: Wetlands, Coastal, and Nearshore Habitats Replenish and Protect Living Coastal and Marine Resources: Birds	$6,000,000
Upper Pascagoula River Water Quality Enhancement	Restore Water Quality: NR (Nonpoint Source)	$4,000,000

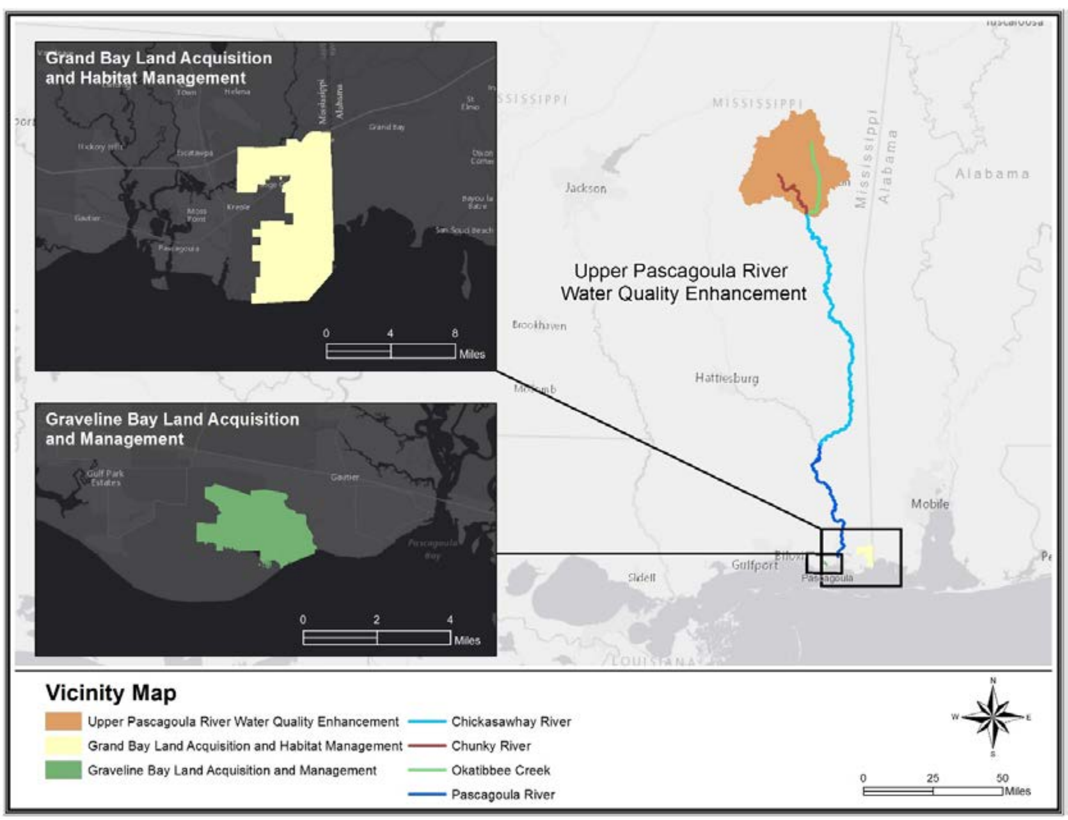

Figure 1.6-1: Project locations associated with Proposed Preferred Alternatives/Projects for this RP/EA.

In order to identify the reasonable range of alternatives for this RP/EA, the MS TIG reviewed PDARP/PEIS Programmatic Trustee Goals for restoration and developed additional specific MS TIG 2016-2017 Goals and Objectives. The MS TIG identified three Restoration Types from the PDARP/PEIS - WCNH, Birds, and NR (Nonpoint Source) - that the MS TIG considered appropriate for focus in this RP/EA. The MS TIG then screened project submittals against OPA appropriateness criteria identified in the PDARP/PEIS. Further detail on the screening process can be found in Section 2.4 of this RP/EA.

The MS TIG will evaluate additional restoration alternatives in Mississippi in subsequent restoration plans. Projects not proposed for implementation in this RP/EA that are consistent with the PDARP/PEIS's objectives and goals may be considered for future restoration in Mississippi. Additional NEPA analysis will be performed on future projects.

1.7 Public Involvement

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

1.7.1 Public Involvement in the Development of this RP/EA

As discussed above in Section 1.3.4, the MS TIG published a Notice of Initiation for Restoration Planning in response to the *DWH* Oil Spill on May 27, 2016 (hereafter, May 27 2016 Notice). In developing this RP/EA, the MS TIG considered projects previously submitted to the MDEQ Restoration Project Idea portal[11] and the Trustee Project Submission Portal,[12] as well as those proposed in response to the May 27, 2016 Notice. On October 31, 2016, the MS TIG published a Notice of Initiation for Restoration Plan Drafting in Mississippi.[13] On December 27, 2016, the MS TIG published a Draft RP/EA. The public was encouraged to review and comment on the Draft RP/EA during a forty-five (45) day comment period. The MS TIG hosted a web-based comment submission site, and provided a P.O. Box and email address as other means for the public to provide comments. As a result, the MS TIG received submissions from private citizens; state, and local agencies; and non-governmental organizations. The public comment period closed on February 10, 2017, after which time the MS TIG considered submitted comments in preparation of this RP/EA.

[11] http://www.restore.ms/submit-project-idea/
[12] http://www.gulfspillrestoration.noaa.gov/restoration/give-us-your-ideas/suggest-a-restoration-project/
[13] http://www.restore.ms/ms-tig-plan/

Section 6 of this document provides further detail on the public comment process and includes a summary of all relevant public comments received on the Draft RP/EA and MS TIG responses. This RP/EA reflects revisions to the Draft RP/EA arising from public comments; progress on compliance with other laws, regulations and Executive Orders; and continuing MS TIG project development and consideration of potentially relevant information.

1.7.2 Administrative Record

Pursuant to 15 C.F.R. § 990.45, the Trustees opened a publicly available Administrative Record for the *DWH* Oil Spill NRDA, including restoration planning activities, concurrently with the 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, which can be found at http://www.doi.gov/deepwaterhorizon/adminrecord. Information about MS TIG restoration project implementation is being provided to the public through the Administrative Record and other outreach efforts, including at http://www.gulfspllrestoration.noaa.gov.

1.8 Severability of Projects

In this RP/EA, the MS TIG proposes to select three preferred restoration alternatives with funding of $21.5 Million (M). The alternatives are independent of each other and may be selected independently for implementation in this and/or future restoration plans by the MS TIG.

1.9 Decisions to be Made

The RP/EA was intended to inform decision-makers and provide the public with information and analysis needed to enable meaningful review and comment on the MS TIG's proposal to proceed with selecting up to three restoration projects (preferred alternatives) using *DWH* NRDA funds. Projects not identified for inclusion in the RP/EA may continue to be considered for inclusion in future restoration plans.

The MS TIG proposes to select three of the proposed preferred alternatives/projects for implementation: Graveline Bay Land Acquisition and Management; Grand Bay Land Acquisition and Habitat Management; and the Upper Pascagoula River Water Quality Enhancement project. After finalizing this RP/EA, a decision will be made whether a Finding of No Significant Impact (FONSI) is appropriate. After the NEPA process is complete, implementation of the projects, if approved, would be funded by a MS TIG resolution.

1.10 Document Organization

This RP/EA is divided into the following sections:

- **Section 1 (Introduction):** Introductory information and context for this document;
- **Section 2 (Restoration Planning Process):** Background on the NRDA restoration planning process, summary of injuries to resources resulting from the *DWH* Oil Spill that the MS TIG intends to address in this RP/EA, screening of a suite of restoration projects to address those injuries, and development of the reasonable range of alternatives;

- **Section 3 (OPA Evaluation of Alternatives and NEPA Affected Environment and Environmental Consequences):** Evaluation of projects proposed for NRDA restoration, proposal of a suite of preferred restoration alternatives, and discussion of NEPA compliance;
- **Section 4 (Compliance with Other Laws and Regulations):** Discussion of additional federal and state laws that may apply to the proposed preferred alternatives;
- **Section 5 (Monitoring and Adaptive Management):** Discussion of monitoring and adaptive management requirements for *DWH* Oil Spill NRDA restoration projects;
- **Section 6 (Public Comments):** Summary of all relevant public comments received on the Draft RP/EA and Trustee responses; and
- **Section 7 (List of Preparers and Reviewers):** Identification of individuals who substantively contributed to the development of this document.

2.0 Restoration Planning Process

NRDA restoration under OPA is a process that includes evaluating injuries to natural resources and natural resource services to determine the types and extent of restoration needed to address the injuries. This RP/EA is consistent with and tiers from the PDARP/PEIS, a programmatic document developed by the Trustees to provide high-level guidance for identifying, evaluating, and selecting future *DWH* restoration projects. Under OPA, the NRDA regulations (15 C.F.R. § 990.54) provide criteria to be used by Trustees to evaluate projects designed to compensate the public for injuries caused by oil spills. To meet the NRDA regulations, the Trustees must identify a reasonable range of restoration alternatives (15 C.F.R. § 990.53) and then evaluate those proposed alternatives. The MS TIG utilized the MGCRP, numerous other regional restoration and ecosystem management planning documents, and project ideas submitted through the MDEQ Restoration Project Idea portal and the Trustee Project Submission Portal during development of this RP/EA. This section of the RP/EA summarizes the restoration planning process for the MS TIG, including planning objectives of the MGCRP, the project screening process developed by the MS TIG, and a discussion of the resulting reasonable range of alternatives.

2.1 Injuries Addressed in this RP/EA

Chapter 4 of the PDARP/PEIS summarizes the injury assessment which established the nature, degree, and extent of injuries from the *DWH* incident to both natural resources and the services they provide. Restoration projects proposed in this RP/EA and in future MS TIG restoration plans are designed to help address injuries in Mississippi resulting from the *DWH* Oil Spill. As discussed in Section 1.0 above, this RP/EA focuses on the following Restoration Types which are described in the PDARP/PEIS: WCNH, Birds, and NR (Nonpoint Source).

2.1.1 Wetlands, Coastal, and Nearshore Habitats

The *DWH* Oil Spill caused significant injuries to Mississippi's nearshore marine ecosystem, including interrelated and biologically diverse habitats such as estuarine coastal wetland complexes, beaches and dunes, barrier islands, submerged aquatic vegetation (SAV), oyster reefs, and shallow unvegetated areas (see PDARP/PEIS Section 4.6.1.1 Ecological Description, p. 4-292). Injuries were detected over a range of species, communities, and habitats, affecting a wide variety of ecosystem components (PDARP/PEIS Section 4.6.9). The Trustees allocated the greatest amount of funding to the Restore and Conserve Habitat goal, because of the critical role that coastal and nearshore habitats play in the overall productivity of the Gulf of Mexico. The MS TIG recognizes that one of three general restoration program areas of the MGCRP is Land Resources, which focuses on the need to conserve and manage priority lands, including lands already under protection. Objectives outlined in the program include conserving priority habitats by utilizing land protection tools such as fee title acquisition, conservation easements, and land donations; as well as managing and restoring priority habitats through actions including management plans, invasive species management, the use of prescribed fire (where appropriate), and enhancement of riparian zone buffers.

2.1.2 Birds

More than 150 species of birds occur in waters and wetlands of the northern Gulf of Mexico for at least a portion of their lives, and nearly 300 species use either the coast itself or coastal upland habitat directly adjacent to the Gulf. As discussed in the PDARP/PEIS (Section 4.7), exposure to oil injured a large number of bird species occupying different habitats, including open water, beaches, island waterbird colonies, bays, and coastal marshes. The *DWH* Oil Spill affected all nearshore habitats along the northern Gulf, including those in Mississippi. Given the extensive injuries to birds and their various habitats in Mississippi, the MS TIG decided to focus on development of a reasonable range of alternatives for projects that would help restore bird injuries. Addressing this Restoration Type is consistent with the MGCRP's Coastal and Marine Living Resources Program, which is intended to restore and stabilize populations of ecologically and commercially and or recreationally important coastal and marine species at sustainable levels. One of the program objectives is sustainable management and enhancement of coastal and marine living resource populations through restoration actions, such as reducing human disturbance of birds and bird nest predation.

2.1.3 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). This Restoration Type ties directly into the Water Resources Program vision described in the MGCRP, which is to restore and enhance the ecological and hydrological integrity of our water resources, including improved water quality and ensuring natural water quantity levels to our coastal bays and estuaries and coastal rivers and streams. One of the defined objectives of this vision is reduction of rural nonpoint source pollution by implementing and improving agricultural, forestry and 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.

2.2 *DWH* Early Restoration Addressing Injuries to Date In Mississippi

During *DWH* NRDA Early Restoration, the Trustees selected the following two projects for implementation in Mississippi that are included in the WCNH Restoration Type.

<u>Hancock County Marsh Living Shoreline</u>: This project is intended to employ living shoreline techniques, including natural and artificial breakwater material and marsh creation, to reduce shoreline erosion by dampening wave energy while encouraging reestablishment of habitat that once was present in the region. The project will provide for construction of up to 5.9 miles of living breakwater, approximately 46 acres of marsh creation, and approximately 46 acres of subtidal reef

restoration in Heron Bay to increase secondary productivity in the area. The project will reduce shoreline erosion, create habitat for secondary productivity, and protect and create salt marsh habitat. More details on this project can be found in the Phase III Early Restoration Plan.[14]

Restoring Living Shorelines and Reefs in Mississippi Estuaries: The project will restore secondary productivity through the placement of intertidal and subtidal reefs and the use of living shoreline techniques including breakwaters. The project will be implemented at locations in Grand Bay, Graveline Bay, Back Bay of Biloxi and vicinity, and St. Louis Bay in Jackson, Harrison, and Hancock Counties, Mississippi. The project builds on recent collaborative projects implemented by the Mississippi Department of Marine Resources (MDMR), NOAA, and The Nature Conservancy. The project will construct over four miles of breakwaters, five acres of intertidal reef habitat, and 267 acres of subtidal reef habitat. Over time, the breakwaters, intertidal, and subtidal restoration areas will develop into living reefs that support benthic secondary productivity, including, but not limited to, oysters/bivalve mollusks, annelid worms, shrimp, and crabs. Breakwaters will reduce shoreline erosion as well as marsh loss. More details on this project can be found in the Phase IV Early Restoration Plan.[15]

One Early Restoration project was selected for implementation in Mississippi associated with the "Birds" Restoration Type, as described below.

Enhanced Management of Avian Breeding Habitat Injured by Response in the Florida Panhandle, Alabama, and Mississippi: The Enhanced Management of Avian Breeding Habitat Injured by Response Activities in the Florida Panhandle, Alabama, and Mississippi project reduced disturbance to nesting and foraging habitat for beach-nesting birds in the project areas. The project involved three tasks: (1) placing symbolic fencing (signs and posts connected with rope) around sensitive nesting sites of beach-nesting birds to indicate the site as off-limits to people, pets, and other sources of disturbance; (2) increasing predator control to reduce disturbance and loss of eggs, chicks, and adult beach-nesting birds at nesting sites; and (3) increasing surveillance and monitoring of posted nesting sites to assess disturbance to nesting habitat in posted areas. In Mississippi, the project was implemented on Gulf Island National Seashore (GUIS) - Mississippi District. More details on this project can be found in the Phase II Early Restoration Plan.[16]

No Early Restoration projects have been selected in Mississippi that would be included in the NR (Nonpoint Source) Restoration Type.

More information on the status of all *DWH* NRDA Early Restoration projects and a summary of funds obligated and expended on each project can be found on NOAA's Gulf Spill Restoration Early Restoration Project Atlas.[17]

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[14] http://www.gulfspillrestoration.noaa.gov/restoration/early-restoration/phase-iii
[15] http://www.gulfspillrestoration.noaa.gov/restoration/early-restoration/phase-iv
[16] http://www.gulfspillrestoration.noaa.gov/sites/default/files/wp-content/uploads/Phase-II-ERP-ER-12-21-12.pdf
[17] http://www.gulfspillrestoration.noaa.gov/restoration/early-restoration/early-restoration-projects-atlas

2.3 Coordination with Other Gulf Restoration Programs

As discussed in the PDARP/PEIS Chapter 1.5.6, the Trustees are committed to coordination with other Gulf of Mexico restoration programs to maximize the overall ecosystem benefit of *DWH* NRDA restoration efforts. This coordination will ensure that funds are allocated strategically to restoration projects across the affected regions of the Gulf of Mexico and in Mississippi.

The MS TIG will continue efforts to coordinate project development and leveraging in cooperation with the other *DWH* funding streams – the NFWF GEBF and the RESTORE Act. To that end, the MGCRP described above was funded by NFWF GEBF and was released by MDEQ in 2015. As discussed, this plan sets forth a process for identification of restoration actions in priority habitat and resource areas that result in ecologically sound and sustainable projects. Its purpose was to "Create a plan that would result in a coordinated, systemic, and transparent process for sustainable ecological restoration in Mississippi, that will direct funds associated with the GEBF, and be applicable to informing ecological restoration funding associated with the RESTORE Act."

The Graveline Bay Land Acquisition and Management preferred alternative/project would leverage NFWF funding already awarded for habitat acquisition and management in the proposed project area. The Grand Bay Land Acquisition and Habitat Management preferred project alternative would leverage NFWF GEBF and RESTORE Act funding already awarded for habitat acquisition and management in the proposed project area.

2.4 Screening for Potential Alternatives

Following the OPA regulations (15 C.F.R. § 990.53), the MS TIG developed a screening process to develop a reasonable range of alternatives to be further evaluated in this RP/EA. This process included compiling ideas submitted by the public through the MDEQ Restoration Project Idea Portal, the Trustee Project Submission Portal, and in response to the May 27, 2016 Notice, and screening them to identify projects intended to help restore WCNH, Birds, and NR (Nonpoint Source) Restoration Types in Mississippi. The MS TIG then evaluated these MS TIG Projects against (1) the Programmatic Trustee Goals for restoration outlined in the PDARP/PEIS for the WCNH, Birds, and NR (Nonpoint Source) Restoration Types; (2) the restoration approaches and restoration techniques for these Restoration Types, as described and evaluated against the OPA criteria found in 15 C.F.R. § 990.54 in Appendix 5D of the PDARP/PEIS; (3) the MS TIG goals and objectives developed as part of this RP/EA; and (4) additional considerations identified by the MS TIG. The MS TIG project screening process is illustrated in a step-wise manner in Figure 2.4.-1 and discussed below. All project ideas were evaluated in a similar fashion and against the same criteria.

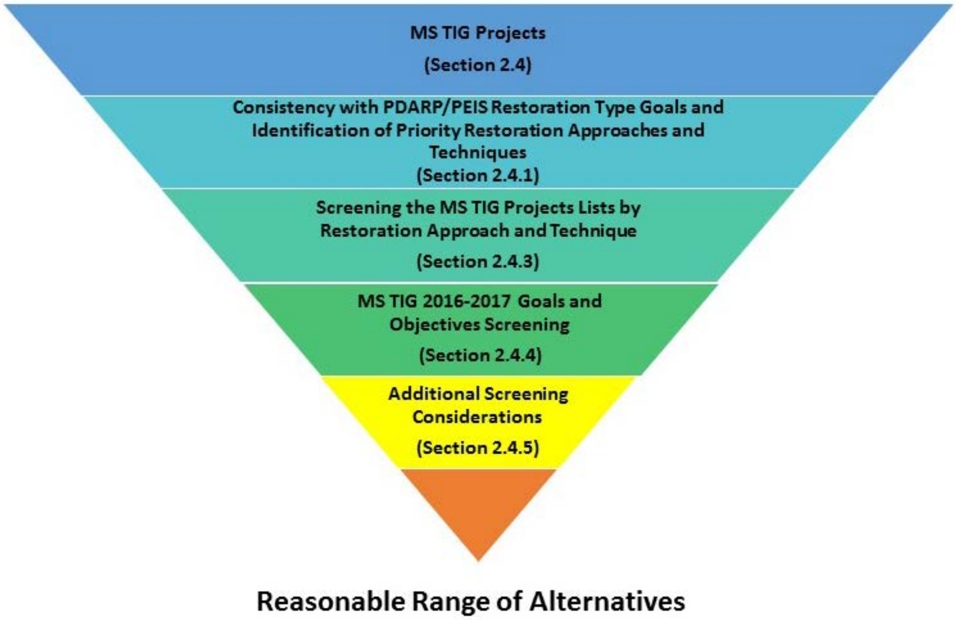

Figure 2.4-1: Generalized Process of Identifying the Reasonable Range of Alternatives.

2.4.1. Restoration Type Sorting

The figure below (Figure 2.4-2, taken from the PDARP/PEIS) graphically summarizes the PDARP/PEIS Restoration Types, the comprehensive restoration plan, Programmatic Trustee Goals for restoration and their related Restoration Type(s), and related restoration approaches. Monitoring, adaptive management, and administrative oversight are planned throughout all Restoration Types.

As described in Section 1.3.4, the MS TIG identified three Restoration Types described in the PDARP/PEIS - WCNH, Birds, and NR (Nonpoint Source) - to prioritize for this RP/EA. The MS TIG began its screening process by compiling all submitted projects and sorted the combined, cumulative project list according to those Restoration Types; a total of 1,144 projects were listed. Because many portal submissions did not contain sufficient detail as stand-alone project ideas or overlapped in scope, the MS TIG eliminated duplicate project ideas and further developed other restoration project ideas, using components of submitted ideas, regional management plans, and resource expertise within the MS TIG. After removing these projects, the list of “MS TIG Projects” for WCNH and Birds included 62 ideas, and the list of “MS TIG Projects” for NR (Nonpoint Source) included 133.

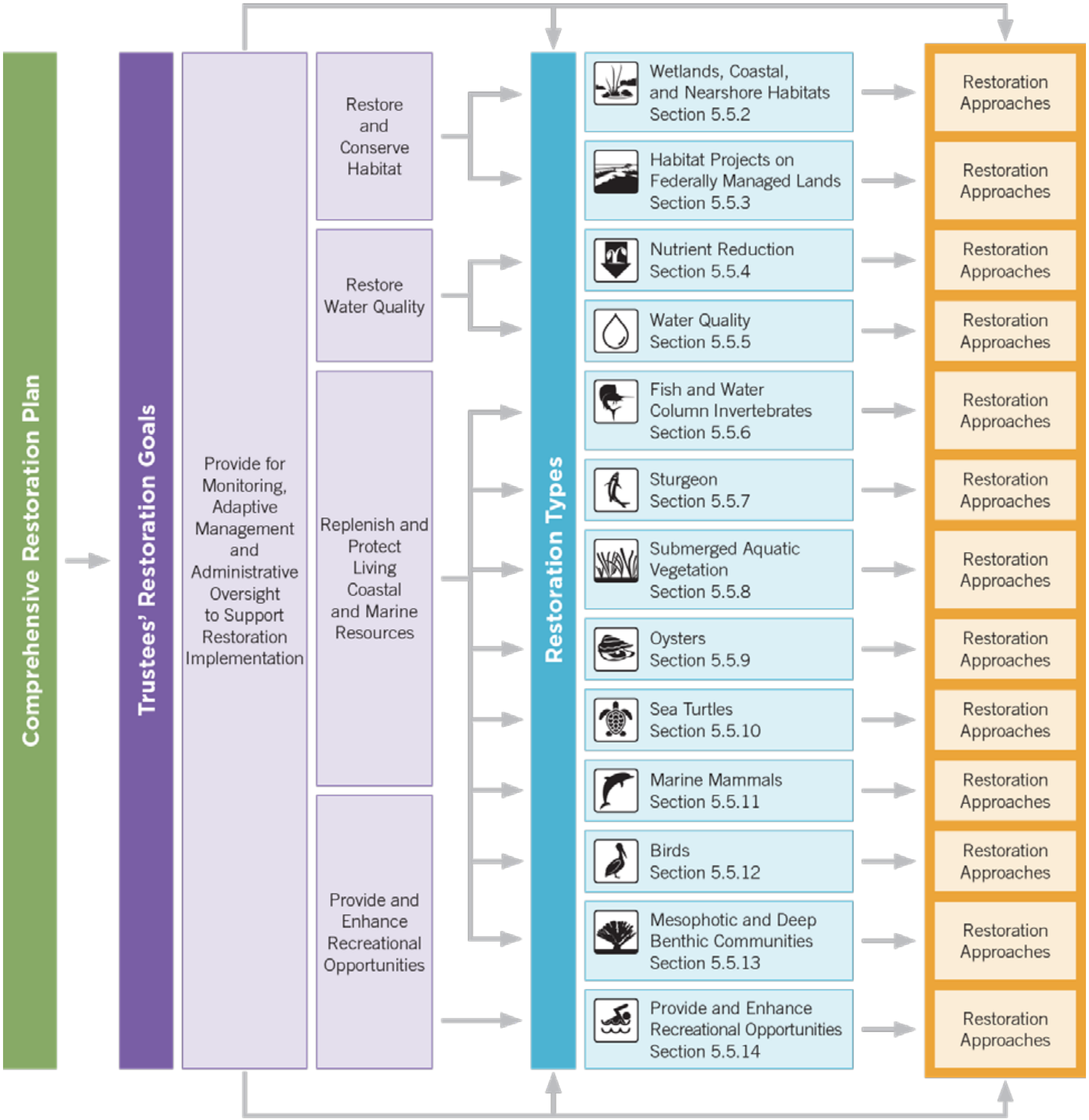

Figure 2.4-2: *DWH* Programmatic Trustee Goals for restoration and associated Restoration Types and Restoration Approaches (provided as Figure 5.4-1 in the PDARP/PEIS).

2.4.2. Consistency with PDARP/PEIS Restoration Type Goals and Identification of Priority Restoration Approaches and Techniques

After compiling the "MS TIG Projects" lists, the MS TIG screened those projects for consistency with the PDARP/PEIS Restoration Type goals for the WCNH, Birds, and NR (Nonpoint Source) Restoration Types. Identification of the relevant Restoration Type goals and the priority restoration approaches and techniques for each Restoration Type was conducted, as described below.

<u>WCNH Restoration Type</u>: Multiple benefits can be derived through restoration of WCNH at a large scale. The specific goals of the WCNH Restoration Type include:

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

<u>Birds Restoration Type</u>: The MS TIG considered projects that would help restore birds injured by the *DWH* Oil Spill. Under the Replenish and Protect Living Coastal and Marine Resources Programmatic Goal, the MS TIG will focus on the Birds Restoration Type. Specific restoration goals of the Birds Restoration Type include:

- 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.

<u>NR (Nonpoint Source) Restoration Type</u>: The MS TIG recognizes that nutrient pollution adversely impacts water quality and poses a significant threat to localized watersheds across the Gulf Coast. NR measures can benefit the estuaries that are integral habitat for many important species. Under the Restore Water Quality Programmatic Goal, the MS TIG will focus on the NR (Nonpoint Source) Restoration Type, and these specific Restoration Type goals:

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

- Where appropriate, co-locate nutrient load reduction projects with other restoration projects to enhance ecological services provided by other restoration approaches.
- Enhance ecosystem services of existing and restored Gulf Coast habitats.

Next, based on a review of the PDARP/PEIS Restoration Type goals, in light of the MS TIG 2016-2017 Goals and Objectives (see Section 2.4.4), and the MGCRP program priorities (discussed below), the MS TIG identified a set of priority restoration approaches from the PDARP/PEIS associated with the WCNH, Birds, and NR (Nonpoint Source) Restoration Types for this RP/EA. The rationale for selecting these priority restoration approaches and associated restoration techniques, and the related decisions made for project screening, are outlined below.

<u>Protect and Conserve Marine, Coastal, Estuarine, and Riparian Habitats; Restore and Conserve Bird Nesting and Foraging Habitat</u>: WCNH is a broad Restoration Type which could include restoration techniques such as beneficial use, land acquisition, habitat enhancement/restoration on public and private lands, backfilling canals, and numerous other techniques. The restoration goals of the WCNH Restoration Type include the consideration of connectivity, size, and proximity to other land conservation projects. The OPA screening for this RP/EA was focused on land acquisition for the purpose of protection, conservation, and restoration/management of coastal marine and riparian habitats so as to achieve multiple benefits, including birds, which fall under the Birds Restoration Type.[18] The Birds Restoration Type also includes Protect and Conserve Marine, Coastal, Estuarine, and Riparian habitats, enhancing habitat through vegetation management and nesting and foraging area stewardship. For these reasons, the MS TIG completed a screening process where the WCNH Restoration Type and the Birds Restoration Type were combined and evaluated together, with a focus on the Protect and Conserve Marine, Coastal, Estuarine, and Riparian Habitats and Restore and Conserve Bird Nesting and Foraging Habitat restoration approaches and the land acquisition and management restoration techniques.

<u>Reduce Nutrient Loads to Coastal Watersheds</u>: The NR (Nonpoint Source) Restoration Type includes Reduce Nutrient Loads to Coastal Watersheds as a restoration approach, with agricultural conservation practices and forestry management practices identified as restoration techniques under this restoration approach. The MS TIG recognizes that nutrient and sediment load reduction in upstream rivers is important to maximizing water quality benefits in the Mississippi Sound. Accordingly, for the purposes of this RP/EA, the MS TIG's screening focused on the Reduce Nutrient Loads to Coastal Watersheds restoration approach and agricultural and forestry management practices as restoration techniques.

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[18] Birds also includes Land Acquisition-Protect and Conserve Marine, Coastal, Estuarine, and Riparian Habitats.

In sum, the MS TIG selected the following restoration approaches and techniques for screening:

- WCNH
  Approach: Protect and Conserve Marine, Coastal, Estuarine, and Riparian Habitats
  Techniques: Acquire lands for conservation and Develop and implement management actions in conservation areas and/or restoration projects
- Birds
  Approach: Restore and Conserve Bird Nesting and Foraging Habitat
  Techniques: Enhance habitat through vegetation management and Nesting and foraging area stewardship
- NR (Nonpoint Source)
  Approach: Reduce Nutrient Loads to Coastal Watersheds
  Techniques: Agricultural conservation practices and Forestry management practices

MS TIG projects included 62 projects that were consistent with selected restoration approaches and techniques for WCNH and Birds. For the NR Restoration Type, there were 133 projects that were consistent with the selected restoration approach and techniques. Screening the MS TIG Projects as depicted in Figure 2.4.1 is described in Section 2.4.3.

2.4.3 Screening the MS TIG Projects by Restoration Approach and Technique

The restoration approaches and techniques included in the PDARP/PEIS were analyzed against the OPA evaluation criteria found at 15 C.F.R. § 990.54, as described in Appendix 5.D of the PDARP/PEIS. This section describes how the MS TIG used the information found in Appendix 5.D to evaluate the MS TIG Projects within the WCNH, Birds, and NR (Nonpoint Source) Restoration Types for screening purposes.

2.4.3.1 WCNH and Birds

For WCNH and Birds, MS TIG Projects were screened against the restoration approaches and techniques evaluated in Appendix 5.D of the PDARP/PEIS, as discussed below.

Restoration Approaches: As described above, the MS TIG considered two restoration approaches under the WCNH and Birds Restoration Types - Protect and Conserve Marine, Coastal, Estuarine and Riparian Habitats; and Restore and Conserve Bird Nesting and Foraging Habitat. The approaches and their OPA appropriateness evaluation, as described in Appendix 5.D, are discussed below:

<u>Protect and Conserve Marine Coastal, Estuarine and Riparian Habitats (Appendix 5.D; D.1.7.2; page 5-239)</u>: This restoration approach can help return injured natural resources and services to baseline conditions by minimizing or eliminating the potential for future loss or degradation of protected lands and or enhancing the ecosystem services provided by protected lands over time when compared to the future of those protected areas without the conservation actions. It can also help to compensate for interim service losses to 1) coastal and riparian buffer uplands; 2) coastal wetland, oyster, SAV, or beach/barrier island habitats; and 3) nearshore and offshore living coastal and marine resources (fish, shellfish, birds, sea turtles, and marine mammals) that were adversely affected by the *DWH* Oil Spill. These techniques have been well demonstrated and this approach is highly likely to succeed.

Additionally, collateral injury to other natural resources is expected to be minimal or avoided entirely. The MS TIG does not anticipate that the approach will negatively affect public health or safety and consider the approach likely to benefit other natural resources.

Restore and Conserve Bird Nesting and Foraging Habitat (Appendix 5 D; D.6.1.2; page 5-307): This restoration approach can restore injured natural resources and services to baseline conditions by supporting increased health and reproduction of birds. This approach may also help compensate for interim services losses to birds adversely affected by the *DWH* Oil Spill through restoring, rehabilitating, and/or replacing habitats that provide services to injured bird species. These are established techniques to provide services to birds. Collateral injury to other natural resources is expected to be minimal and short-term, however, project selection and design considered potential impacts on existing habitat. The project approach is not expected to negatively affect public health or safety. Additionally, the MS TIG considers it likely that it will also benefit additional natural resources.

MS TIG projects were screened against these restoration approaches. Consistent with the PDARP/PEIS goals, the purposes of these restoration approaches, and their associated restoration techniques (discussed in Section 2.4.2), the MS TIG considered projects that would help compensate for interim service losses to injured birds, and selected projects for further consideration that provided bird nest protection/bird production, habitat acquisition, and habitat restoration. Projects that were not consistent with the goals and restoration approaches discussed above, and were thus eliminated from further consideration in this plan, included monitoring, wildlife rehabilitation, recreational loss, stormwater management, nutrient reduction, and prairie restoration projects, as well as those already funded by another source or multiple redundant entries of the same project. A total of 62 projects were considered as part of this step, 41 were retained for further screening, and 21 projects were eliminated.

2.4.3.2 NR (Nonpoint Source)

For NR (Nonpoint Source), MS TIG Projects were screened against the restoration approaches and techniques evaluated in Appendix 5.D of the PDARP/PEIS, as discussed below.

Restoration Approaches: As described above, the MS TIG considered one restoration approach under the NR (Nonpoint Source) Restoration Type - Reduce Nutrient Loads to Coastal Watersheds. This approach and its OPA appropriateness evaluation, as described in Appendix 5.D, are discussed below.

Reduce Nutrient Loads to Coastal Watersheds (D.2.1.2; page 5-242): This approach enhances ecosystem services provided by restored habitats and resources and may return injured natural resources and services to baseline conditions by reducing nutrient loads to coastal watersheds, improving water quality, reducing the extent of eutrophication and occurrence of hypoxia and/or HABs, reducing turbidity, and increasing light penetration. This approach can help compensate for interim services losses to estuarine-dependent water column resources, oysters, SAV, and recreational uses adversely affected by the *DWH* Oil Spill. It also compensates for lost ecosystem services by reducing nutrient runoff, which will improve water quality and mitigate chronic ecosystem threats and impaired recreational use to provide ecosystem benefits to injured resources and habitats. This project approach has demonstrated effectiveness as shown in numerous studies by the USDA's

Conservation Effects Assessment Program (CEAP) and water quality restoration “Success Stories” for the EPA Section 319 Nonpoint Source Management Program grants. The risk of collateral injury to other natural resources is expected to be minimal. Collateral injury could occur during project construction, but these effects can be minimized during the design process. The MS TIG does not anticipate that the approach will negatively affect public health or safety and considers it likely to benefit additional natural resources.

The MS TIG Projects were screened against this restoration approach. Consistent with the PDARP/PEIS goals, the purposes of this restoration approach, and its associated restoration techniques, the MS TIG considered nutrient reduction projects and those that would compensate for interim or lost services, and retained nutrient reduction, water quality, and sediment reduction projects for further consideration. Projects that were eliminated from consideration included multiple redundant entries of the same project, monitoring projects, infrastructure projects, and water quality projects such as dredging, debris removal, and drainage improvements. A total of 133 projects were considered at this step, 29 projects were retained for further screening, and 104 projects were eliminated.

2.4.4 MS TIG 2016-2017 Goals and Objectives Screening

After ensuring consistency with the PDARP/PEIS Restoration Type goals for WCNH, Birds, and NR (Nonpoint Source), the MS TIG identified four broad objectives for projects screened and ultimately proposed within this RP/EA: regional connectivity; leveraging; project partnering opportunities; and synergy with existing regional planning initiatives.

- Regional Connectivity: A key goal in the development of the restoration strategy for WCNH Restoration Type in the PDARP/PEIS is to restore a variety of interspersed and ecologically connected coastal habitats. In addition, TIGs are encouraged to “Consider design factors, such as connectivity, size, and distance between projects, to address injuries to the associated living coastal and marine resources and restore the ecological functions provided by those habitats.” Conservation, management and restoration of habitats are also MGCRP Land Program priorities. Preservation, restoration, regional connectivity and proximity to state and federal conservation lands were key factors in determining restoration approaches/techniques in the PDARP/PEIS and in the screening of projects in this RP/EA.
- Leveraging: The MS TIG considered opportunities to leverage NFWF GEBF and RESTORE funding in the screening and selection of projects within this RP/EA. The MS TIG also considered the extent that NFWF GEBF funds or RESTORE funds have been programmed to accomplish a restoration initiative or projects in the project screening.
- Partnering: The MS TIG considered Trustee expertise from state and federal programs and/or resource management expertise. Opportunities to share resource management expertise and funded programs were considered in the selection of restoration techniques and in the screening of projects.

- Regional Planning Initiatives: Synergy with regional plans and planning initiatives was also an objective considered in project screening. The relevant plans and planning initiatives considered include the MGCRP, Mississippi Sandhill Crane National Wildlife Refuge and Grand Bay National Wildlife Refuge planning documents, MDMR management plans, US Army Corps of Engineers (USACE) Mississippi Coastal Improvement Plan (MsCIP), and the MDMR Coastal Preserves (CP) planning initiative.[19]

Table 2.4-1 demonstrates how the MS TIG's preferred restoration approaches/techniques for WCNH, Birds, and NR (Nonpoint Source) Restoration Types align with MGCRP program objectives.

For the purposes of screening, the MS TIG considered WCNH and Bird projects that would provide regional connectivity, leveraging opportunities, multiple trustee engagement, and consistency with the MGCRP and the PDARP/PEIS. Projects considered further after this screening step included large acquisitions, habitat restoration, and projects that could be leveraged with funds outside of the NRDA process, such as RESTORE or NFWF GEBF funds. Projects that were eliminated included projects that provided only limited regional connectivity. A total of 41 projects were considered at this step, 19 projects were retained and 22 projects were eliminated.

Regarding NR (Nonpoint Source) projects, the MS TIG further considered the following projects, consistent with its goals and objectives for this RP/EA, agricultural conservation practices and forestry management practices that would provide nutrient and sediment reduction, projects that would leverage other funding opportunities, projects with the potential for multiple trustee engagement, and projects that were consistent with the MGCRP and with the PDARP/PEIS. As a result, nutrient and sediment reduction projects were considered further at this screening step. Projects that were eliminated included multiple redundant entries of the same project or projects that provided similar benefits, or projects where nutrient and sediment reduction was only a minor component. A total of 29 projects were considered at this step, 10 projects were retained and 19 projects were eliminated.

[19] http://www.dmr.ms.gov/index.php/mississippi-gems

Table 2.4-1: PDARP/PEIS Restoration Approaches/ MGCRP priorities and MS TIG Goals and Objectives.

	Mississippi Coastal Restoration Plan			MS TIG Goals and Objectives			
PDARP/PEIS Restoration Types/Approaches/Techniques	**MS Land Resources Program Priority**	**MS Coastal and Marine Resources Priority**	**MS Water Resources Program Priority**	**Regional Connectivity**	**Leveraging**	**Partnering/Multiple Trustee Engagement**	**Existing Regional Planning Initiatives**
Wetland Coastal And Nearshore Habitats							
Acquire lands for conservation	X	-	X	X	X	X	X
Develop and implement management actions in conservation areas and/or restoration projects	X	-	X	X	X	X	X
Nutrient Reduction (Nonpoint Source)-(Also includes Protect and Conserve Marine Coastal, Estuarine, and Riparian habitats)							
Reduce Nutrient Loads to Coastal Watersheds	-	-	X	-	X	X	X
Agricultural conservation practices	-	-	X	-	X	X	X
Forestry management practices	-	-	X	-	X	X	X
Implement erosion and sediment control (ESC) practices	-	-	X	-	X	-	-
Birds (Also includes Protect and Conserve Marine Coastal, Estuarine, and Riparian habitats)							
Restore and Conserve Bird Nesting and Foraging Habitat	-	-	-	-	-	X	-
Enhance habitat through vegetation management	X	-	X	X	X	X	X
Nesting and foraging area stewardship	-	X	-	-	X	X	-

2.4.5 Additional Screening Considerations

The MS TIG developed additional considerations, described below, to assist in the selection of the reasonable range of alternatives for the WCNH, Birds, and NR (Nonpoint Source) Restoration Types.

2.4.5.1 WCNH and Birds Restoration Types

The MS TIG also screened projects for compliance with the following additional considerations allowed under OPA, which were developed by the MS TIG for the 2016-2017 funding cycle:

- Project is consistent with regional planning efforts or ongoing restoration efforts including National Wildlife Refuge (NWR) management plans, the MS CP program, and others;
- Project has willing seller(s); and
- Project has management opportunity on adjacent lands.

The MS TIG also evaluated the potential for projects to involve large-scale acquisition and habitat restoration. Projects that were not further considered included those for which sufficient detail was lacking and where project components were included in other programs/projects (CP Tracts). A total of 19 projects were considered at this step, 2 projects were retained, and 17 projects were eliminated.

Following this screening step, the MS TIG selected two proposed WCNH and Bird projects to be included, in addition to the No Action Alternative, as part of the reasonable range of alternatives for this RP/EA: 1) the Graveline Bay Land Acquisition and Management proposed alternative; and 2) the Grand Bay Land Acquisition and Habitat Management proposed alternative. The final development of the reasonable range of alternatives, including variations on the Grand Bay Land Acquisition and Habitat Management proposal, are discussed in Section 2.6.

2.4.5.2 NR (Nonpoint Source) Restoration Type

The MS TIG also screened projects for compliance with the following additional considerations which were developed by the MS TIG for the RP/EA.

- Conservation practices on agricultural lands in cooperation with landowners, and that could be leveraged by existing MS TIG Trustee programs, such as the USDA-NRCS Farm Bill and other programs;
- Projects that would reduce nutrient and sediment load contribution in the Pascagoula River watershed, which contains Gulf sturgeon Critical Habitat; and
- Selection of the appropriate sub-watershed in which conservation practices applied to land uses would maximize water quality benefits in the Mississippi Sound, particularly sediment removal.

The MS TIG considered projects that would result in nutrient and sediment reduction, that would involve USDA program participation, and for which the MS TIG had demonstrated experience in the geographic area. The MS TIG kept projects that included the implementation of agricultural conservation practices that would reduce nutrient runoff from the landscape; reduce nutrient loads to streams and downstream receiving waters; and could provide benefits to marine resources and benefits to coastal watersheds. Projects that were eliminated included best management practices (BMPs) that do not provide a benefit to agricultural and forested lands. A total of 10 projects were considered at this step, 2 projects were retained and 8 projects were eliminated.

Following this screening step, and consistent with the discussion of the WCNH and Birds projects not considered for further evaluation, as described in Section 2.5 below, the MS TIG selected the following two NR (Nonpoint Source) projects to be included, in addition to the No Action Alternative, in the reasonable range of alternatives for this RP/EA: 1) the Upper Pascagoula River Water Quality Enhancement proposed alternative and 2) the Pascagoula River Basin Riparian Buffer Maintenance Plan proposed alternative. The final development of the reasonable range of alternatives is discussed in Section 2.6.

2.5 Alternatives not Considered for Further Evaluation in this RP/EA

This section provides additional detail on a set of WCNH and Birds project alternatives considered by the MS TIG but not considered for further evaluation for this RP/EA.

Following the screening steps outlined above, there were a number of land acquisition and management project submittals which included acquisition and management of larger acreage that could provide benefits to WCNH and Birds. These projects collectively include acquisition to expand the Mississippi CP sites and related management activities (discussed below). These individual projects were considered through the screening process and it was determined that they met the screening criteria, and with further development could be selected in a future restoration plan.

A review of the collective Mississippi CP project submittals is summarized below. See Section 2.4 for a discussion of the screening of projects within this RP/EA and reasons for eliminating various projects not further considered for development as part the reasonable range of alternatives. These projects may continue to be considered for inclusion in future TIG restoration plans.

Review of Mississippi CP Project: This review combines project submittals proposing protection of ecologically significant parcels from willing sellers in the three coastal counties. The parcels would be located within or adjacent to CP boundaries, and would then be preserved and managed by the MDMR Mississippi CP system. Currently, the Mississippi CP system manages over 36,000 acres of coastal lands. Project proposals include up to 183,000 acres of acquisition that were not selected for evaluation in this RP/EA, the larger projects occurring in the following areas:

- Biloxi River Marsh CP Acquisition
- Escatawpa River Marsh CP Acquisition
- Pascagoula River Marsh CP Acquisition
- Wolf River Restoration Project
- Bellefontaine Marsh Preserve Land Protection
- Old Fort Bayou Land Protection
- Tchoutacabouffa Land Protection
- Delisle Bayou Land Protection
- Ansley Area Land Protection Land Acquisition- Jourdan River CP

Although this large-scale land acquisition program would protect WCNH and Bird habitat, including slash pine forest, estuarine and intertidal wetlands, and beaches, the project components are geographically disparate, and beyond the financial scope of the current funds available to the MS TIG. The MS TIG coordinated with MDMR to consider its acquisition priorities as well as the 2016-2017 MS TIG goals and objectives, including connectivity and the use of existing management plans. The MS TIG developed its proposed large land acquisition and management projects, including the Graveline Bay CP and the Grand Bay Savanna CP projects, from the list because of (1) the existing planning at Grand Bay NWR, Grand Bay National Estuarine Research Reserve (NERR), and the Grand Bay Savanna CP, as well as (2) the proximity/connectivity benefits that Graveline Bay CP provides considering these and other large conservation areas nearby (such as the Sandhill Crane NWR). Additionally, activities within Grand Bay NWR, Grand Bay NERR, and Graveline Bay CP have been considered in previous restoration plans, NEPA analyses, and state planning efforts. Components of proposed projects discussed in this section, which were not selected for development of the reasonable range of alternatives, and thus for further analysis in this RP/EA, may be considered in future MS TIG restoration plans.

2.6 Reasonable Range of Restoration Alternatives Considered

The final development of the reasonable range of alternatives for the OPA selected projects for WCNH, Birds, and NR (Nonpoint Source) Restoration Types is discussed here.

2.6.1 Restoration Type: WCNH and Birds

WCNH and Birds screening process described above resulted in identification of two projects for development as the reasonable range of alternatives: Graveline Bay Land Acquisition and Management, and Grand Bay Land Acquisition and Habitat Management. There is one proposed alternative for the proposed Graveline Bay project area, three alternative means of accomplishing the goals in the proposed Grand Bay project area, and the No Action Alternative. The WCNH and Birds alternatives for the RP/EA are:

- Alternative A (Preferred): Graveline Bay Land Acquisition and Management
- Alternative B: Grand Bay Land Acquisition (up to 8,000 acres)
- Alternative C: Grand Bay Habitat Management (up to 17,500 acres)
- Alternative D (Preferred): Grand Bay Land Acquisition (up to 8,000 acres) and Habitat Management (up to 17,500 acres); Alternatives B and C combined
- No Action Alternative

The MS TIG considered existing management plans and planning initiatives in the identification of projects and the final development of the reasonable range of alternatives, including the following.

Graveline Bay CP: The MDMR CP Program includes tracts throughout the coastal counties in Mississippi. The Graveline Bay CP was one of the initial acquisitions by the State of Mississippi dedicated as a CP. Existing monitoring activities by the state and cooperative partners include marsh bird monitoring, routine salinity monitoring and shellfish surveys. Much of the property is considered tidal wetlands owned by the State. The State manages the area as a CP for conservation purposes to protect ecological integrity of tidal marsh and adjacent uplands. Threats to the ecological integrity of the Graveline Bay CP include the potential for future development of habitat adjacent to the marsh, septic tank contamination from adjacent development, and limited flushing action of the bay. Graveline Bay CP priorities include acquisition of properties within and adjacent to CP boundaries and habitat management of the same.

Grand Bay NWR, NERR, and Grand Bay Savanna CP: There are currently several management documents used by natural resource agencies managing habitats within the project boundary. These documents would be used as guidance to select and prescribe the appropriate restoration measures and management activities on a parcel by parcel basis. A summary of each of these documents is provided below:

Grand Bay National Estuarine Research Reserve Final Environmental Impact Statement/Reserve Management Plan:[20] This EIS was finalized in 1998 by the MDMR. The purpose of this plan was to designate the area as part of the NERR. For designation, a reserve management plan was produced and in 2013 was updated. The Grand Bay NERR Management Plan 2013-2018 frames out stewardship, resource protection, public use/access, research and monitoring, education and coastal training plans.

Grand Bay National Wildlife Refuge Comprehensive Conservation Plan:[21] This plan was finalized in 2008 by USFWS. The purpose of the plan was to guide management actions and direction over a 15-year period. Specifically, the Comprehensive Conservation Plan (CCP) was written to:

- Provide a clear statement of the refuge's management direction;
- Provide refuge neighbors, visitors, and government officials with an understanding of the USFWS's management actions on and around the refuge;
- Ensure that the USFWS's management actions, including land protection and recreation/education programs, are consistent with the mandates of the NWR System; and
- Provide a basis for development of the refuge's budget requests for operations, maintenance, and capital improvement needs.

Land Protection Plan and Final Environmental Assessment for the Expansion of Grand Bay National Wildlife Refuge:[22] This plan was finalized in 2012 by USFWS. This plan identified the proposed acquisition boundary for the proposed expansion of NWR. It delineated approximately 8,428 acres from four areas adjacent to the refuge for acquisition, restoration, enhancement, and management. The purpose of the proposed refuge expansion was to conserve valuable riverine habitat, to protect threatened and endangered species, to restore and protect key habitats (i.e., coastal savanna and longleaf pine), and to manage populations of migratory birds and other interjurisdictional trust species.

2.6.1.1 Alternative A (Preferred): Graveline Bay Land Acquisition and Management

The proposed Graveline Bay Land Acquisition and Management alternative includes acquiring and managing parcels within the existing Graveline Bay CP and nearby privately and publicly owned lands. Development is a threat to habitats adjacent to the preserve. To the north, residential developments are adjacent to developable uplands that currently buffer the Graveline marsh. Municipal land use plans reflect the project area for the proposed alternative is zoned as new growth,

[20] http://grandbaynerr.org/wp-content/uploads/2010/08/Grand-Bay-NERR-Final-Environmental-Impact-Statement-Reserve-Management-Plan.pdf
[21] https://catalog.data.gov/dataset/grand-bay-national-wildlife-refuge-comprehensive-conservation-plan
[22] https://restorethegulf.gov/sites/default/files/documents/images/Grand%20Bay%20Final%20Land%20Protection%20Plan%20and%20Environmental%20Assessment.pdf

which would allow residential and commercial development. Without protection, the MS TIG anticipates that future residential development would continue in these areas. The proposed alternative would be implemented at locations in Graveline Bay in Jackson County, Mississippi. The planning process for Alternative A has been a collaboration between MDMR and the MS TIG. Proposed Alternative A includes the acquisition of land from willing sellers, preservation, and habitat enhancement of up to 1,410 acres. Habitat to be acquired includes estuarine marsh, shoreline (beach) and other coastal riparian habitats which provide foraging, loafing and nesting for bird species that were injured in the *DWH* Oil Spill. Restoration measures and benefits would include acquisition to reduce the threat of development, direct enhancement of habitat, decreased habitat fragmentation and increased habitat connectivity to other large conservation parcels in the area. Protection of shoreline habitat from vehicle traffic would also enhance shorebird nesting success. The MS TIG proposes to allocate up to $8,050,000 from its WCNH resource category and up to $3,450,000 from its Birds resource category to fund this activity. Additional details for proposed Alternative A (including restoration measures) are provided in Section 3 of this document.

2.6.1.2 Alternative B: Grand Bay Land Acquisition (up to 8,000 acres)

The goal of Alternative B is to acquire up to 8,000 acres of estuarine freshwater marsh, savannas and flatwoods, forested freshwater scrub-shrub, coastal marsh and/or beach within the boundaries of Grand Bay NWR/NERR and Grand Bay Savanna CP. Doing so would help restore injuries to WCNH as well as habitats on which injured bird species rely. Public ownership of these habitats would help protect them in perpetuity. Acquiring these habitats would also facilitate more efficient and effective restoration and management of lands and waters within these boundaries by leading to larger blocks of contiguous habitat which can be managed and protected. The MS TIG proposes to allocate up to $4.2 M from its WCNH resource category and up to $1.8 M from its Birds resource category to fund this activity. Acquisition would continue with available funding for up to 15 years. Additional details for Alternative B are provided in Chapter 3 of this document.

2.6.1.3 Alternative C: Grand Bay Habitat Management (up to 17,500 acres)

The goal of Alternative C is to implement management activities on up to 17,500 acres of current publicly owned land over the course of 15 years. Target habitats would include coastal marsh, beach, freshwater marsh, savannas and flatwoods, and forested freshwater scrub-shrub in Grand Bay NWR, Grand Bay NERR and Grand Bay Savanna CP. The MS TIG would propose to allocate up to $4.2 M from its WCNH resource category and up to $1.8 M from its Birds resource category to fund this activity. Additional details for Alternative C are further described in Chapter 3.

2.6.1.4 Alternative D (Preferred): Grand Bay Land Acquisition (up to 8,000 acres) and Habitat Management (up to 17,500 acres)

Alternative D proposes to implement both habitat acquisition and restoration (a combination of alternatives B and C) to help restore injuries to WCNH and Birds in Mississippi. The primary objective of coastal land acquisition and restoration is to protect important contiguous lands and waters in an effort to maximize efficiencies and effectiveness in restoring and managing those habitats for the benefit of coastal resources. Implementing these activities within the proposed alternative boundary is consistent with and supports the mission and goals of the Grand Bay NWR, Grand Bay NERR and Grand Bay Savanna CP management plans and initiatives. For Grand Bay NWR, acquisition and restoration measures and management activities have been developed in plans which incorporated a public vetting process and analyses under NEPA.[23,24] While land acquisition alone can be a valuable habitat protection tool, habitat management is often necessary for landscape-level conservation to allow connectivity with adjacent habitats. Private inholdings and associated land use and structures within the project boundary for proposed Alternative D create challenges for landscape-level habitat management in the area. The MS TIG therefore believes a combined strategy of land acquisition and habitat management represents the most comprehensive approach to help restore injuries to WCNH at this site, as well as maximizing the potential to provide services to injured bird species within target habitats affected by the alternative. Prioritizing public ownership of acquisitions ensures permanent protection of the MS TIG's investment. Collaborating with managers and staff at Grand Bay NWR, Grand Bay NERR, and Grand Bay Savanna CP would constitute a valuable partnership in reaching MS TIG goals. Acquisition and management would be implemented with available funding for up to 15 years. The MS TIG proposes to allocate up to $6 M for this alternative: $4.2 M from its WCNH Restoration Type and up to $1.8 M from it Birds Restoration Type. Additional details for proposed Alternative D are provided in Section 3 of this document.

2.6.1.5 Natural Recovery/No Action

As required by OPA regulations, the PDARP 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 a natural recovery alternative, no additional restoration would be done by Trustees to accelerate the recovery of injured natural resources or to compensate for lost services. 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 deterioration. Although injured resources could presumably recover to at or near baseline conditions under this scenario, recovery would take much longer compared to a scenario in which restoration actions were undertaken. Given that technically feasible restoration approaches are available to compensate for interim natural resource and service losses, the Trustees rejected this alternative from further OPA evaluation within the PDARP. Based on this determination, and tiering this RP from the PDARP and incorporating that analysis by reference, the MS TIG did not evaluate natural recovery for WCNH or Birds Restoration Types as a viable alternative under OPA and natural recovery is not considered further in this RP.

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[23] Grand Bay National Wildlife Refuge comprehensive conservation plan, available at https://www.fws.gov/southeast/planning/CCP/GrandBayFinalPg.html.

[24] Land protection plan and final environmental assessment for the expansion of Grand Bay National Wildlife Refuge, available at https://www.fws.gov/southeast/planning/PDFdocsLandAcquisition/Grand%20Bay%20Final%20LPP%20EA/GrandBay4_Final_LPP%20Formatted.pdf

As NEPA requires consideration of a no action alternative as a basis for comparison of potential environmental consequences of the action alternatives(s), a no action alternative is evaluated in that sense within this environmental assessment. This analysis presents the conditions that would result if the MS TIG did not select to undertake any additional restoration for injured natural resources or to compensate for lost services at this time. The environmental consequences of such an alternative are evaluated in Section 3.2 for comparison with the remaining action alternatives.

2.6.2 Restoration Type NR (Nonpoint Source)

The final development of the reasonable range of alternatives for the NR (Nonpoint Source) Restoration Type is discussed here. Screening of NR (Nonpoint Source) projects resulted in identification of two projects for development as the reasonable range of alternatives:

- Alternative A (Preferred): Upper Pascagoula River Water Quality Enhancement
- Alternative B: Pascagoula River Basin Riparian Buffer Maintenance Plan
- No Action Alternative

2.6.2.1 Alternative A (Preferred): Upper Pascagoula River Water Quality Enhancement

The health of the Gulf of Mexico depends upon the health of its estuaries, and the health of those coastal waters is influenced by land use upstream along tributary rivers. Runoff from cropland, pasture/grassland, associated agriculture lands and forestland contributes nutrients and sediment that adversely impact the health of coastal waters of the Gulf. While agricultural and forested lands are not the sole contributors of nutrients to coastal waters, there are tremendous opportunities to address this resource concern at its source. The primary goal of the Upper Pascagoula River Water Quality Enhancement alternative is water quality improvement through the development and implementation of conservation plans and practices to reduce nutrient and sediment runoff into coastal waters. The Chunky-Okatibbee watersheds were selected for implementation of the proposed Alternative A based on sediment load contributions to coastal waters. Alternative A would be implemented by the United States Department of Agriculture (USDA), Natural Resource Conservation Service (NRCS) in Mississippi (USDA-NRCS). The USDA-NRCS would provide outreach and technical assistance to voluntary participants (landowners), especially on the most vulnerable acres in the watersheds, to develop conservation plans and would use all conservation practices as shown in Appendix B and typically planned and funded by USDA-NRCS programs. The USDA would develop conservation plans within a 20,000-acre area with a priority on opportunities in critical areas for the greatest reduction in nutrient losses that are also within one mile of tributaries. Given the success of USDA-NRCS Farm Bill programs, their strong acceptance by private landowners, and the existence of an effective program execution, there is a significant opportunity to implement conservation practices, especially in critical acres, on private lands that would reduce the levels of nutrients and sediments entering the Gulf of Mexico. Upper Pascagoula River Water Quality Enhancement would be a 5-year program. Conservation practices, especially those systems that avoid, control and trap nutrient and sediment losses, would be implemented on cropland, pasture/grassland, forestland, and associated agriculture land within the Chunky-Okatibbee watersheds. The estimated cost for this preferred alternative is \$4.0 M. The MS TIG proposes to allocate \$4.0 M from its NR (Nonpoint Source)

Restoration Type for this activity, and the USDA will invest $1.0 M of Farm Bill funding in the same watershed. Additional details for Proposed Alternative A are provided in Section 3 of this document.

2.6.2.2 Alternative B: Pascagoula River Basin Riparian Buffer Maintenance Plan

The Pascagoula River Basin Riparian Buffer Maintenance Plan (Alternative B) would provide outreach and technical assistance to voluntary participants (landowners) to develop conservation plans in riparian areas and would use all conservation practices as shown in Appendix B and typically planned and funded by USDA-NRCS programs. Riparian buffers act to partially protect streams from the impact of adjacent land uses. Buffers increase water quality in associated streams as sediment and runoff is intercepted. Riparian buffers also serve to provide habitat and reduce bank erosion by providing bank stabilization. With planning and monitoring, riparian buffers would help control channel instability, head-cutting, mass slumping, and wetland degradation. Like Alternative A, USDA-NRCS would develop conservation plans within a 20,000-acre area with priority on opportunities that are within one mile of tributaries. Ecological/NR conservation practices would be implemented in riparian areas within forestland and associated agriculture lands and forests on farmsteads in the Chunky-Okatibbee watersheds in Mississippi. This alternative would be a 5-year program. The estimated cost for this preferred alternative is $ 4.0 M which would be allocated from the NR Restoration Type. USDA-NRCS would invest $1.0 M of Farm Bill funding in the same watershed. Additional details for proposed Alternative B are provided in Section 3 of this document.

2.6.2.3 Natural Recovery/No Action

As required by OPA regulations, the PDARP 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 a natural recovery alternative, no additional restoration would be done by Trustees to accelerate the recovery of injured natural resources or to compensate for lost services. 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 deterioration. Although injured resources could presumably recover to at or near baseline conditions under this scenario, recovery would take much longer compared to a scenario in which restoration actions were undertaken. Given that technically feasible restoration approaches are available to compensate for interim natural resource and service losses, the Trustees rejected this alternative from further OPA evaluation within the PDARP. Based on this determination, and tiering this RP from the PDARP and incorporating that analysis by reference, the MS TIG did not evaluate natural recovery for NR (Nonpoint Source) Restoration Type as a viable alternative under OPA and natural recovery is not considered further in this RP.

As NEPA requires consideration of a no action alternative as a basis for comparison of potential environmental consequences of the action alternatives(s), a no action alternative is evaluated in that sense within this environmental assessment. This analysis presents the conditions that would result if the MS TIG did not select to undertake any additional restoration for injured natural resources or to compensate for lost services at this time. The environmental consequences of such an alternative are evaluated in Section 3.8 for comparison with the remaining action alternatives.

2.7 Alternatives Evaluated in this RP/EA

The following alternatives are evaluated in Section 3 under both OPA and NEPA. The map below (Figure 2.7-1) shows the locations of the proposed project areas for proposed alternatives that are evaluated in this RP/EA. A summary is also provided below.

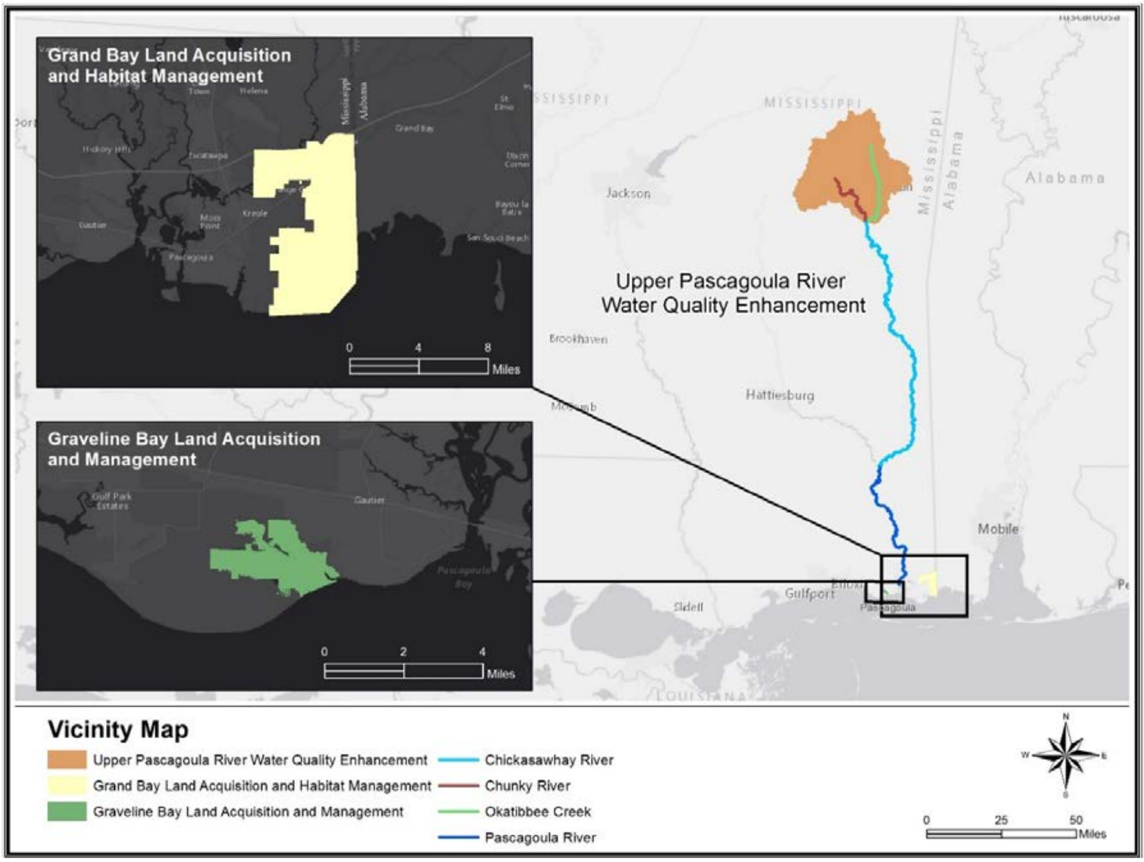

Figure 2.7-1: Project Areas for the Proposed Reasonable Range of Alternatives for this RP/EA.

Wetlands, Coastal, and Nearshore Habitats and Birds
The reasonable range of alternatives for the WCNH and Birds Restoration Types includes five proposed alternatives including the No Action. There is one alternative for Graveline Bay Land Acquisition and Management, three alternative means of accomplishing Grand Bay Land Acquisition and Habitat Management, and the No Action Alternative. The WCNH and Birds alternatives for the RP/EA described in the above sections are:

- Alternative A (Preferred): Graveline Bay Land Acquisition and Management
- Alternative B: Grand Bay Land Acquisition (up to 8,000 acres)
- Alternative C: Grand Bay Habitat Management (up to 17,500 acres)
- Alternative D (Preferred): Grand Bay Land Acquisition (Up to 8,000 acres) and Habitat Management (Up to 17,500 acres)
- No Action Alternative

NR (Nonpoint Source)

The reasonable range of alternatives for NR (Nonpoint Source) Restoration Type includes three proposed alternatives including the No Action. The proposed alternatives for the NR (Nonpoint Source) Restoration Type for the RP/EA described in the above sections are:

- Alternative A (Preferred): Upper Pascagoula River Water Quality Enhancement
- Alternative B: Pascagoula River Basin Riparian Buffer Maintenance Plan
- No Action Alternative

3.0 OPA Evaluation of Alternatives and NEPA Affected Environment and Environmental Consequences

This section analyzes the proposed alternatives evaluated under OPA for the Restoration Types proposed for selection in this RP/EA. Section 3.1.1 provides an OPA evaluation for the WCNH and Birds Restoration Types. Section 3.8.1 provides an OPA evaluation for the NR (Nonpoint Source) Restoration Type.

Similarly, Section 3.3.1 and 3.4.1 provide the NEPA affected environment and environmental consequences for proposed WCNH and Birds Restoration Type alternatives, and Section 3.9.1 provides the NEPA affected environment and environmental consequences for proposed NR (Nonpoint Source) Restoration Type alternatives.

The MS TIG elected to prepare a programmatic analysis of the environmental consequences of the range of alternatives developed for the selected Restoration Types to (1) consider the multiple related actions that would occur because of this restoration planning effort, and (2) allow for a better analysis of cumulative impacts. Prior to implementation of restoration measures, management activities, and conservation practices, site-specific environmental evaluations would be conducted as described herein. So long as the adverse impacts of particular site-specific restoration measures and management activities are at or below the levels described in this RP/EA, no additional environmental assessments or environmental impact statements would be required before implementation. Should site-specific environmental evaluation indicate the potential for significant adverse effects or effects beyond those disclosed in this RP/EA, an EA or EIS would be prepared, or the site-specific project would be modified so that the level of impacts were at or below the levels described in this RP/EA. Finally, to ensure that any properties acquired pursuant to this RP/EA are preserved for the restoration purposes identified in this plan, acquired lands will be subject to restrictions that assure their proper use and conservation.

3.1 WCNH and Birds Restoration Types

Section 3.1.1 provides the OPA evaluation for the No Action Alternative and WCNH and Birds Alternatives A-D. Land acquisition and related habitat management would be dependent on willing sellers, successful acquisition, and planning of restoration measures and management activities. Section 3.1.2 also describes the programmatic nature of the NEPA analysis for WCNH and Bird Alternatives A-D as well as MS TIG approach for NEPA review after restoration measures and management activities have been identified for specific parcels.

3.1.1 OPA Evaluation for WCNH and Birds

The proposed project alternatives are consistent with the Restore and Conserve Habitat Programmatic Goal for the WCNH and Birds Restoration Types and the Replenish and Protect Living Coastal and Marine Resources Programmatic Goal for the Birds Restoration Type in the PDARP/PEIS. Table 3.1-1 provides an OPA evaluation of each proposed alternative using the standard OPA evaluation criteria described in 40 C.F.R. §990.54. These OPA evaluation criteria are:

- The cost to carry out the alternative (The Cost).
- 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 (Restoration Goals and Objectives).
- The likelihood of success of each alternative (Likelihood of Success).
- The extent to which each alternative will prevent future injury as a result of the incident and avoid collateral injury as a result of implementing the alternative (Avoidance of Further Injury/Collateral Injury).
- The extent to which each alternative benefits more than one natural resource and/or service (Multiple Resource Benefits).
- The effect of each alternative on public health and safety (Public Health and Safety).

Table: 3.1-1: OPA Evaluation Criteria.

Alternatives	OPA Evaluation Criteria
Cost	
Alternative A: Graveline Bay Land Acquisition and Management Project	**Alternative A:** The cost of $11.5 M for land acquisition, management and monitoring is reasonable for the proposed Alternative A. The Implementing Trustees, through individual and partnering agency experience, have implemented similar projects and anticipate that implementation of Alternative A would result in benefits to WCNH and Birds and would provide connectivity benefits. Parcel acquisition costs would be based on appraised value and any management and monitoring contracts would be subject to either MS or Federal acquisition regulations to ensure open competition and competitive pricing.
Alternative B: Grand Bay Land Acquisition; Up to 8,000 acres; **Alternative C: Grand Bay Habitat Management (up to 17,500 acres);** **Alternative D: Grand Bay Land Acquisition and Habitat Management Project (Alts. B+C)**	**Alternatives B-D:** The cost of $6.0 M for Alternative B, land acquisition (up to 8,000 acres), Alternative C, habitat management (up to 17,500 acres) or Alternative D (B+C) where ultimate funding for habitat management (C) would depend, in part, on funding used for acquisition (B), is reasonable for the proposed alternatives and is based on the costs of similar acquisition and habitat management projects conducted in the area. The MS TIG anticipates that funding would result in benefits to WCNH and Birds, and would provide connectivity benefits. For Alternative B, the cost would allow for the acquisition of more acreage without the benefits of habitat management. Parcel acquisition costs would be based on appraised value. For Alternative C, more acres of habitat could be managed without the benefit of preserving additional habitat through acquisition. Any management and monitoring contracts would be subject to either MS or Federal acquisition regulations to ensure open competition and competitive pricing. Although Alternative D would provide for less acreage in acquisition and habitat management, it would provide more flexibility for strategic and opportunistic acquisition, while focusing appropriate habitat management measures on parcels to maximize the cost per unit of benefit. Further, similar to Alternatives B and C, land acquisition would be based on appraised values and management and monitoring would be subject to either MS or Federal acquisition regulations to ensure open competition and competitive pricing.
Restoration Goals and Objectives	
Alternative A: Graveline Bay Land Acquisition and Management Project	**Alternative A** has a clear nexus to the WCNH and Birds injuries described in the PDARP/PEIS because it would result in the acquisition and restoration of interrelated and biologically diverse habitats injured as a result of the *DWH* Oil Spill. Restoration measures would include land acquisition and preservation of WCNH including estuarine marsh, beach, beech-magnolia forest, coastal plain small stream forest, fire suppressed pine savanna, and open water including tidal creeks and bayous habitats. Land acquisition and preservation would provide habitat connectivity by expanding state ownership of parcels near and adjacent to Graveline Bay Marsh Preserve, where the threat of development is high. Land acquisition and preservation would also serve to restore and conserve bird nesting and foraging habitat for bird species that were injured in the *DWH* Oil Spill. Restriction of vehicle traffic from sensitive shoreline areas would improve shorebird nesting success, and the bay, marsh, adjoining upland forest, and undeveloped beach front near the mouth of Graveline Bayou are an important landing area for

Alternatives	OPA Evaluation Criteria
	neotropical migrant birds. Direct habitat management measures would include chemical treatment, mechanical treatment, prescribed fires, debris removal and road removal/culvert placement to enhance these habitats for use by many species and to restore them to more natural condition. Further, Alternative A is consistent with existing MS TIG goals and objectives that focus on the use of existing management plans and initiatives, leveraging *DWH* funds, and habitat connectivity. This alternative meets these goals by providing habitat connectivity with the Grand Bay NWR/NERR/Savanna CP, the Sandhill Crane NWR and other wildlife corridors adjacent the project area for the proposed alternative. Leveraging would include NFWF GEBF funding for acquisition and management in the project area.
Alternative B: Grand Bay Land Acquisition; Up to 8,000 acres; **Alternative C: Grand Bay Habitat Management (up to 17,500 acres);** **Alternative D: Grand Bay Land Acquisition and Habitat Management Project (Alts. B+C)**	**Alternatives B-D** have a clear nexus to the WCNH and Birds injuries described in the PDARP/PEIS because they would result in the acquisition and/or restoration of interrelated and biologically diverse habitats injured as a result of the *DWH* Oil Spill. **Alternative B** restoration measures would include land acquisition and preservation of WCNH including coastal marsh, beach, freshwater marsh, pine savanna flatwoods, forested freshwater scrub-shrub, and open water including tidal creeks and bayous. Acquisition and preservation would reduce the threat of development and would provide habitat connectivity to other large conservation parcels in the area. Land acquisition and preservation would also provide services to bird species that were injured in the *DWH* Oil Spill. Further, this alternative is consistent with existing MS TIG goals and objectives and would result in the acquisition and preservation of land that would expand habitat protection in the project area for Alternative B. Leveraging would include RESTORE funding and NFWF GEBF funding for acquisition in the project area. **Alternative C** would directly benefit WCNH and Birds by restoring habitats using techniques that have been well established by Grand Bay NWR and NERR resource managers would be implemented to restore the structure and function of target habitats within the project area, thereby restoring ecosystem services to WCNH and to birds, fish and other wildlife injured by the *DWH* Oil Spill. Direct habitat management measures would include chemical treatment, mechanical treatment, prescribed fire debris removal and/or road removal/culvert placement. Further, Alternative C is consistent with existing MS TIG goals and objectives and would support enhancement of up to 17,500 acres of WCNH, including habitat used by bird species injured by the *DWH* Oil Spill. Alternative C would leverage NFWF GEBF funding already awarded for habitat management in the Alternative C project area. **Alternative D (B+C)** has a clear nexus to the WCNH and Birds injuries described in the PDARP/PEIS because it would result in the acquisition and restoration of interrelated and biologically diverse habitats injured as a result of the *DWH* Oil Spill. This alternative would provide collective habitat connectivity with the Sandhill Crane NWR and Graveline Bay CPs as well as several other wildlife corridors in the area. Elements of Alternative D are discussed in the Grand Bay NERR Management Plan, the Grand Bay NWR Land Protection Plan, and the Grand Bay NWR Comprehensive Conservation Plan. Alternative D would leverage NFWF GEBF and RESTORE Act funding already awarded for habitat acquisition and management in the Alternative D project area. By combining Alternatives B and Alternative C, Alternative D would provide maximum benefits to WCNH and Birds through the strategic targeted combination of land acquisition and habitat management practices, selected by the resource managers with site specific expertise and experience.
Likelihood of Success	
Alternative A: Graveline Bay Land Acquisition and Management Project; **Alternative B: Grand Bay Land Acquisition; Up to 8,000 acres;** **Alternative C: Grand Bay Habitat Management (up to 17,500 acres);** **Alternative D: Grand Bay**	**Alternatives A-D:** The Implementing Trustees, through individual and partnering agency experience, have successfully implemented projects similar to the proposed project alternatives (land acquisition/preservation and habitat management) in the Graveline Bay area, within Grand Bay NWR boundaries, and other similar habitats in the CP system, and proposed restoration activities take advantage of similar ongoing work in these and other nearby areas. This documented experience and successful completion of land acquisition and habitat management projects demonstrates that the proposed project alternatives would have a high likelihood of success. The MS TIG would ensure compliance with all applicable federal laws, regulations and executive orders prior to project implementation, and would conduct all necessary agency consultations for NEPA compliance. The proposed alternatives would meet

Alternatives	OPA Evaluation Criteria
Land Acquisition and Habitat Management Project (Alts. B+C)	all OPA and NEPA requirements as discussed in Sections 3.0 and 4.0 of this RP/EA.
Avoidance of Further Injury/Collateral Injury	
Alternative A: Graveline Bay Land Acquisition and Management Project; **Alternative B: Grand Bay Land Acquisition; Up to 8,000 acres;** **Alternative C: Grand Bay Habitat Management (up to 17,500 acres);** **Alternative D: Grand Bay Land Acquisition and Habitat Management Project (Alts. B+C)**	**Alternatives A-D:** There would be minor to moderate impacts from implementing various restoration measures; however, restoration measures would result in long-term benefits to WCNH and the birds that utilize the habitats. Acquisition and management of large parcels of land would result in benefits to WCNH and Birds injured in the *DWH* Oil Spill that rely on these habitats and therefore would likely prevent ongoing and future injuries to the same types of habitats and resources affected by the *DWH* Oil Spill. The risk of collateral injury would be minimized by the use of best practices (as described in Sections 3.3.1 and 3.4.1) that would be considered in developing parcel specific management actions and during the implementation of habitat management activities.
Multiple Resource Benefits	
Alternative A: Graveline Bay Land Acquisition and Management Project; **Alternative B: Grand Bay Land Acquisition; Up to 8,000 acres;** **Alternative C: Grand Bay Habitat Management (up to 17,500 acres);** **Alternative D: Grand Bay Land Acquisition and Habitat Management Project (Alts. B+C)**	**Alternatives A-D:** Acquisition and preservation of lands in the Graveline Bay CP and the Grand Bay project area for the proposed alternatives would provide multiple resource benefits. The proposed alternatives would include the acquisition of land adjacent to other large conservation parcels in the area owned and managed by the state, serving to increase habitat connectivity by reducing the threat of development. The combination of acquisition and management of these parcels at the landscape scale would provide benefits including the direct enhancement of habitat, to both WCNH as well as service to bird species injured by the *DWH* Oil Spill. Additionally, the habitats protected, restored and enhanced under these alternatives provide food, shelter, breeding, and nursery habitat for many ecologically and economically important animals, including fish, shrimp, birds, and terrestrial mammals. Direct habitat management measures include prescribed fire, mechanical treatment, chemical treatment, access restriction, debris removal, and road removal/culvert placement.
Public Health and Safety	
Alternative A: Graveline Bay Land Acquisition and Management Project; **Alternative B: Grand Bay Land Acquisition; Up to 8,000 acres;** **Alternative C: Grand Bay Habitat Management (up to 17,500 acres);** **Alternative D: Grand Bay Land Acquisition and Habitat Management Project (Alts. B+C)**	**Alternatives A-D:** Effects on public health and safety would include minor short-term impacts resulting from prescribed fires. However, there would be long-term benefits to public health and safety from acquisition, preservation and management of parcels in the floodplain that could be developed if they were not acquired through the proposed alternatives. Restored hydrology resulting from road removal/culvert placement provides a flood risk/public safety benefit by enhancing floodplain functions. The proposed alternative would have a beneficial effect to the surrounding communities. It would promote healthy lifestyles by allowing recreational use on previously private parcels of land.

Project Alternatives A, B, C, and D would meet the evaluation criteria found in 40 C.F.R. § 990.54 because:

- Cost estimates are reasonable, based on the experience of the MS TIG and project partners on similar acquisition and habitat management projects completed in the area;
- The project alternatives have a clear nexus to the WCNH and Bird injuries described in the PDARP/PEIS and the MS TIG's restoration goals and objectives (use of existing management plans and initiatives, leveraging DWH funds and providing habitat connectivity) would be met;
- The MS TIG Trustees and project partners have substantial experience successfully implementing similar projects to the proposed project alternatives (land acquisition/preservation and habitat management) in the Graveline Bay area, the Grand Bay NWR, and other similar habitats in the CP system, and proposed restoration activities take advantage of similar ongoing work in these and other nearby areas. This documented experience and successful completion of land acquisition and habitat management projects demonstrates that the proposed alternatives would have a high likelihood of success;
- Acquisition and management of large parcels of land would result in benefits to WCNH and Birds injured in the *DWH* Oil Spill that rely on these habitats and therefore would likely prevent ongoing and future injuries to the same types of habitats and resources affected by the *DWH* Oil Spill. Future and collateral injury would be avoided by employing best practices in project implementation;
- Each alternative is likely to benefit more than one resource; and
- There would be a long-term benefit to public health and safety from preserving parcels in the floodplain that otherwise might be developed.

Project Alternatives A, B, C and D are also consistent with the MGCRP and other regional planning initiatives and approved management plans being implemented within the Grand Bay NWR, NERR and CP and Graveline CP project areas. Acquiring and/or restoring biologically diverse habitats demonstrates a nexus between injury and the restoration goals. Future management planning and implementation of acquired properties would not require additional OPA evaluation.

3.1.2 NEPA Analytical Approach for WCNH and Birds Restoration Types

This section provides the NEPA analytical approach for the WCNH and Birds Restoration Types including:

- A description of the general NEPA analytical approach for the WCNH and Birds project alternatives;
- The MS TIG plan for site-specific NEPA review for the selected alternative; and
- The organization of the affected environment and environmental consequences for WCNH and Birds Restoration Types.

<u>The NEPA Analytical Approach for the Development of WCNH and Birds Project Alternatives</u>: Proposed WCNH and Birds Alternatives A-D, include acquisition and management of habitat that would benefit the target Restoration Types. If the preferred alternative(s) are ultimately selected, the

Implementing Trustee or project partner(s) would begin willing landowner identification, title surveys, appraisals, etc. and acquisitions.[25] Acquisition of parcels will only be made at appraised value. Additionally, if the preferred alternative(s) are selected, habitat inventories, restoration planning and restoration measures and management activities would be developed for newly acquired land and current publicly owned parcels consistent with existing management plans. The size and location of these acquisitions would depend on successful negotiations to acquire targeted parcels and therefore the extent of the potential adverse and beneficial impacts are evaluated in this RP/EA as a range of potential impacts. Further, restoration measures and management activities would be implemented on a site-specific basis and would vary for each depending on the current condition of the habitat on that site.

The environmental consequences analysis in this RP/EA would be corroborated by a site-specific review because the exact parcels and associated restoration measures and management activities that would be most appropriate on those parcels are not known at this time. The environmental consequences in the RP/EA are based on the extent of the anticipated restoration measures and management activities contemplated on parcels for proposed alternative project areas. This analysis provides a maximum impact to each of the resource categories based on the MS TIG's knowledge of the proposed alternative project area. This RP/EA also presents a process that the MS TIG would follow to complete the requirements of NEPA and other environmental statutes as site-specific restoration measures and management activities are planned. The process is described in more detail below.

<u>The MS TIG Approach to Site-Specific NEPA Review for the Selected Alternative</u>: In the future, the Implementing Trustees would perform additional environmental reviews once parcels and site-specific restoration measures and management activities are developed for a site. The following is a description of the proposed approach to NEPA evaluation for future site-specific restoration measures and management activities for the WCNH and Birds alternatives in this RP/EA.

- Future NEPA evaluations would be conducted by the Implementing Trustees or on behalf of the Implementing Trustee by their project partners by completing an Environmental Evaluation Worksheet (Appendix A of the RP/EA) that would document whether impacts are at or below maximum adverse impacts described in the RP/EA. An example of an Environmental Evaluation Worksheet is attached as Appendix A.
- If impacts from the site-specific restoration measures and management activities are at or below the maximum adverse impacts described in the RP/EA, then the Implementing Trustees would route the finalized Environmental Evaluation Worksheet through the MS TIG for inclusion in the project's Administrative Record.
- If impacts from the site-specific restoration measures and management activities are above maximum adverse impacts described in the RP/EA (e.g. exceed), then the Implementing

[25] The act of acquiring individual parcels would not require parcel-specific NEPA evaluation because the impacts associated with acquisition are evaluated fully in this RP/EA, as well as addressed in Sections 6.4.1 and 6.4.10 of the PDARP/PEIS, for the WCNH and Birds Restoration Types, respectively.

Trustee would notify the MS TIG and conduct additional environmental planning in the form of an environmental assessment on behalf of the MS TIG for TIG review and approval. As an alternative, the Implementing Trustee or project partner could re-design the restoration measures and management activities to ensure that they are below the maximum adverse impacts described in the RP/EA.

- If the Environmental Evaluation is completed by a project partner or the state Implementing Trustee, the federal Implementing Trustee would review and verify whether any additional NEPA analysis is required as described in the example Environmental Evaluation Worksheet attached as Appendix A.

Organization of the Affected Environment and Environmental Consequences for WCNH and Birds Restoration Types: Guidelines for NEPA impact determinations for the Final PDARP/PEIS are described in Section 6.3.2 of the PDARP/PEIS and are incorporated here by reference. The intensity definitions are used in this RP/EA for identifying adverse impacts of the proposed restoration approaches. The analysis uses the intensity definitions in evaluating whether the proposed restoration approaches may result in minor, moderate, or major adverse impacts. WCNH and Birds Alternatives A, B, C and D include land acquisition, habitat management or the combination of both. The NEPA affected environment and environmental consequences for the WCNH and Birds Restoration Types are structured as follows:

- Section 3.2 No Action Alternative for WCNH and Birds Restoration Types
- Section 3.3 Alternative A (Preferred): Graveline Bay Land Acquisition and Management
- Section 3.4 Alternative B (Grand Bay Land Acquisition), C (Grand Bay Habitat management), and Alternative D (Preferred): Grand Bay Land Acquisition and Habitat Management
- Section 3.5 Cumulative Impacts for WCNH and Birds Alternatives
- Section 3.6 Comparison of Alternatives

3.2 No Action

In addition to the proposed alternatives listed above for the WCNH and Birds Restoration Types, the MS TIG evaluated the No Action Alternative (No Action Alternative). NEPA [§ 1502.14(d)] requires consideration of a No Action Alternative as a basis for comparison of potential environmental consequences of the action alternatives.

Under the No Action Alternative, the MS TIG would not implement any projects for the WCNH and Birds Restoration Types at this time, and would instead allow natural recovery processes to occur, which could result in one of four outcomes for injured resources: 1) gradual recovery; 2) partial recovery; 3) no recovery; or 4) further deterioration. Although injured resources could presumably recover to or near baseline conditions under this scenario, recovery would take much longer compared to a scenario in which restoration actions were undertaken.

Under the No Action Alternative, the NRDA Early Restoration projects already approved (Hancock County Marsh Living Shoreline; Restoring Living Shorelines and Reefs in Mississippi Estuaries; and Enhanced Management of Avian Breeding Habitat Injuries by Response in the Florida Panhandle, Alabama and Mississippi) would be the only NRDA restoration implemented for the WCNH and Birds Restoration Type in the MS Restoration Area at this time.

This alternative would have no beneficial impacts to WCNH and Birds 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 WCNH and Birds. Under the No Action Alternative, some WCNH recovery could result from other *DWH* funded projects which propose acquisition and habitat management in the Grand Bay and Graveline Bay proposed project areas (RESTORE and NFWF GEBF), but not from the federal action being evaluated in this RP/EA. Even if funding and implementation of other *DWH* projects does occur in the project areas, the full suite of WCNH and Birds restoration benefits would not be realized due to diminished funding and the lost opportunity for leveraged funding. The No Action Alternative does not meet the MS TIG's goals and objectives and does not provide the restoration benefit to WCNH and Birds that would occur through the proposed alternatives.

When analyzed in combination with other past, present and reasonably foreseeable future actions, the No Action Alternative would provide no beneficial impacts, because existing conditions would not change. This alternative is not expected to contribute to short-term or long term, cumulative adverse impacts to physical resources, biological resources, or socioeconomics, with the following exception. For the proposed Alterative A (Preferred) Graveline Bay Land Acquisition and Management, without NRDA funding for acquisition, it is likely that these properties would be developed. There is a threat of development of privately-held land adjacent to the proposed alternative, including areas which are designated as new growth areas by the cities of Ocean Springs and Gautier. Acquisition and preservation of land in perpetuity would prevent land development in floodplains and loss of habitat. For Alternative D (Preferred) Grand Bay Land Acquisition (up to 8,000 acres) and Habitat Management (Up to 17,500 acres), the No Action Alternative would result in a lack of contiguous parcels acquired for large-scale prescribed fire management. Therefore, by preventing the acquisition and habitat management of parcels in the Alternative A and Alternative D areas, the No Action Alternative would have an adverse long-term minor to moderate impact to geology and substrates, and habitats. The No Action could result in long-term, minor to moderate adverse impacts to floodplain as well as public health and safety related to floodplain filling for the proposed alternative A.

3.3 Graveline Bay Land Acquisition and Management-Background and Project Description

The Graveline Bay Land Acquisition and Management proposed alternative includes acquiring parcels near publicly owned lands in the Graveline Bay CP in Jackson County, Mississippi. Habitat management measures that are currently used on the adjacent public lands are also planned including prescribed fire. The proposed alternative would be implemented at proposed locations in Graveline Bay (Figure 3.3-1). The project planning process has been a collaboration between the MDMR and the MS TIG. Potential acquisitions from willing sellers in the proposed alternative area include approximately 1,410 acres of habitat that could be acquired. Estuarine marsh, shoreline (beach), and other coastal riparian habitats are in the proposed alternative project area, some of which are expected to provide foraging, loafing and nesting for bird species injured by the *DWH* Oil Spill. The estimated cost to implement this proposed alternative is $11.5 M. The lead Implementing Trustee for the project would be MDEQ working with DOI as an Implementing Trustee.[26] DOI will also be the lead federal agency for conducting the environmental evaluation review for implementation. Trustee roles and responsibilities will be defined in accordance with the SOPs. The Mississippi Department of Marine Resources (MDMR) would be a project partner. The proposed alternative would be located on parcels adjacent to and near Graveline Bay in Jackson County, Mississippi. The parcels are located in Sections 4, 5, 9, 10, 15, and 16 of Township 8 South, Range 7 West (Figure 3.3-1).

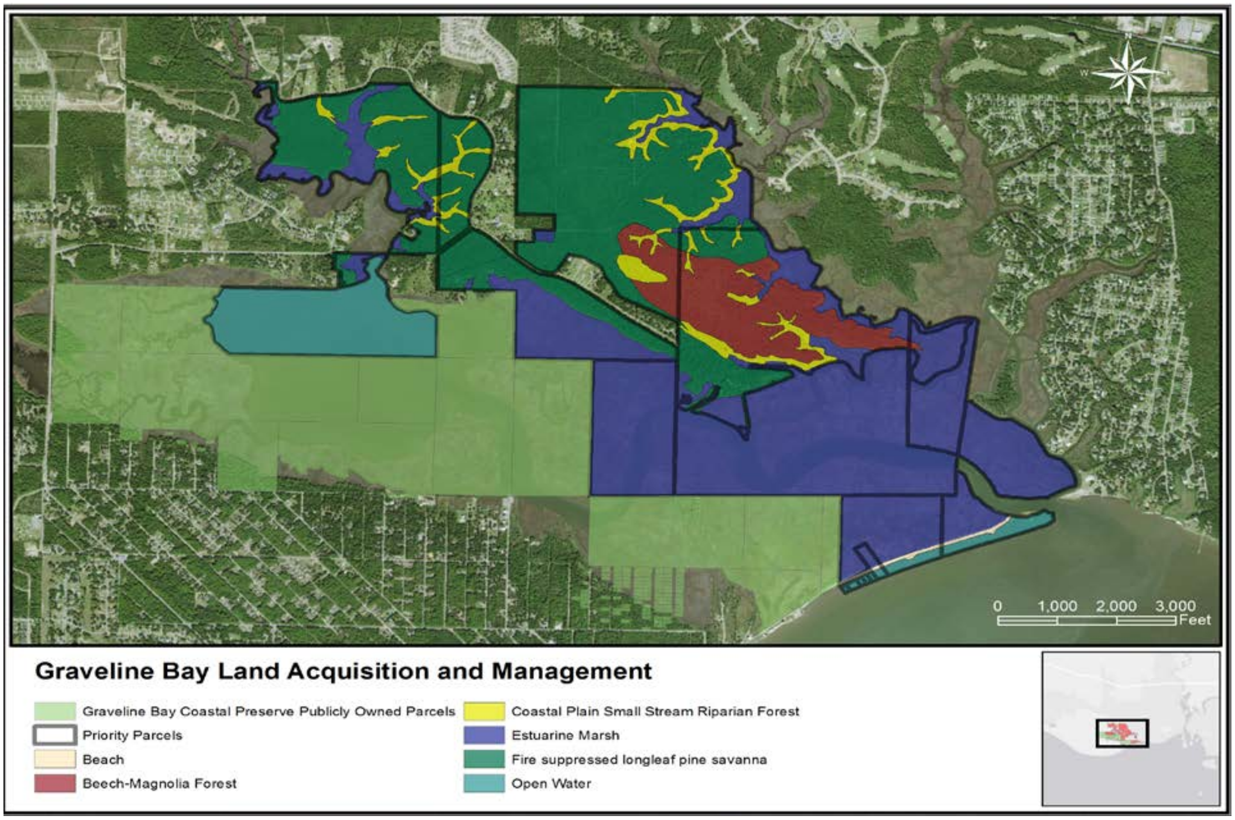

Figure 3.3-1: Graveline Bay Land Acquisition and Management –Parcels and Habitats.

Graveline Bay and Bayou is over 2,100 acres and represents one of the few relatively undisturbed estuarine bays and small tidal creeks in Mississippi.[27] Graveline Bay coastal wetland and nearshore habitats include estuarine marsh, beach, beech-magnolia forest, coastal plain, small stream forest, fire-suppressed pine savanna, and open water including tidal creeks and bayous (Table 3.3-1).

[26] See PDARP Section 7.2.3; and Trustee Council Standard Operating Procedures for Implementation of the Natural Resource Restoration for the *Deepwater Horizon* (DWH) Oil Spill (SOP) Section 9.5.1.1.
[27] http://www.dmr.ms.gov/mississippi-gems/215-graveline-bay

Wetlands, coastal, and nearshore habitat in this area is utilized for foraging, nesting and loafing by bird species injured by the *DWH* Oil Spill. Acquisition and management of parcels in the proposed alternative project area would provide benefits to wading birds and other species. Beach habitat enhancements would benefit nesting shorebirds injured by the *DWH* Oil Spill. The coastal bay and estuarine marsh system of this area consists largely of black needle rush *(Juncus roemerianus*) dominated marsh along its entire length. Smooth cordgrass (*Spartina alterniflora*) occurs largely as narrow (1-3 m) bands along the creeks and bayous. The area supports salt marsh, brackish marsh, and several oyster beds.

Table 3.3-1: Graveline Bay Land Acquisition and Management - Habitats[28] and Ownership Within the Proposed Project Area.[29]

Habitat	Publicly Owned (acres)	Privately Owned (acres)	Total Acreage of Habitat
Estuarine Marsh	582	636	1,218
Beach	1	5	6
Beech Magnolia Forest	0	115	115
Fire-suppressed pine savanna	36	460	496
Coastal Plain Small Stream Forest	0	66	66
Open water, Tidal Creeks and bayous	156	128	284
Total	775	1,410	2,185

Development is a threat to habitats adjacent to the CP. Residential developments exist to the north of the proposed alternative project area. Municipal land use plans would allow the forested habitats within the proposed alternative project area to be similarly developed. Without protection, the MS TIG anticipates that future residential development would continue in these areas.

Section 5.5.2.2 of the PDARP/PEIS describes seven restoration approaches for the WCNH Restoration Type. Section 5.5.12.2 describes eight restoration approaches for the Birds Restoration Type. The restoration approaches proposed by the MS TIG that address the goals and objectives for this project include:

- Protect and conserve marine, coastal, estuarine and riparian habitats; and
- Restore and conserve bird nesting and foraging habitat

[28] Habitat acreage was calculated from available resource map and Trustee experience in the project area. Habitats will be field surveyed during the development of site-specific restoration measures and management activities.
[29] Acreage is based on parcels that are targeted for purchase, some of which are within the CP boundary, some are adjacent.

The proposed alternative has several objectives including: acquisition of properties that have a high threat of development; preserving a buffer to keep adjacent marsh habitat intact; and reducing habitat fragmentation and realizing connectivity benefit that would result from habitat management adjacent to existing state-owned CP land.

The proposed alternative includes (1) the acquisition and preservation of up to 1,410 acres within and adjacent to the CP, and (2) habitat management of both currently owned CP lands and those which would be acquired as part of the alternative. Acquisition and management would be within the 2,185 acres of total habitat within and adjacent to CP boundaries shown on Table 3.3-2.

Restoration Measures-Methodology and Timing
This proposed alternative would include management of habitats within the proposed alternative project area which includes the CP and newly acquired parcels in and adjacent to the CP. The Implementing Trustee would begin landowner identification, title surveys, appraisals, etc. and acquisitions after final RP/EA approval. Additional data collection on target habitats needed to facilitate restoration and management (e.g., habitat inventories, identification of appropriate restoration measures and management activities, etc.) would also be conducted following approval of the project. Restoration measures and management activities would be implemented on a site-specific basis and may vary across the project area depending on the current condition of habitats. Habitat restoration measures and management activities could include vehicular access restriction on Graveline beach; chemical treatment; mechanical treatment; prescribed fire; debris removal; and road repair/removal and culvert placement, described below. Proposed restoration measures and management activities are summarized in Table 3.3-2 and described below.

Table 3.3-2: Restoration Measures and Management Activities by Habitat.

Habitat	Acres of Habitat	Acquisition/Preservation	Access Restriction	Invasive Species Management-Chemical Treatment	Invasive Species Management-Mechanical Treatment	Prescribed Fire	Debris Removal	Road Repair/Removal and Culvert Placement
Estuarine Marsh	1,218	X						
Beach	6	X	X	X	X		X	
Beech Magnolia Forest	115	X		X			X	
Fire-suppressed pine savanna	496	X		X	X	X	X	X
Coastal Plain Small Stream Forest	66	X		X	X		X	X

Acquisition and Preservation: Protection of habitats is consistent with the MS TIG goal to increase connectivity of coastal habitats. Lands would be purchased in fee from willing sellers at appraised value. Acquisition and preservation includes the purchase of land and preservation in perpetuity, facilitating protection of habitat through prevention of large scale development. Acquisition of parcels would only be made at appraisal value. Acquisition and preservation would apply to up to 636 acres of estuarine marsh, 5 acres of beach, 115 acres of beech magnolia forest, 460 acres of fire-suppressed pine savanna, and 66 acres of coastal plain small stream forest. This would be a 10-year project.

Access Restriction: Access restriction following acquisition of parcels containing beach habitat would provide protection of shorebird habitat. Barriers would be placed to restrict all vehicle traffic to sensitive shoreline areas. Restricted access would reduce direct impacts from vegetation and sand disturbance, as well as reduce litter, noise pollution, and environmental effects resulting from target shooting and vehicle traffic. Pedestrian access would be allowed.

Invasive Species Management: Invasive species management would focus on prevention, control and eradication of known exotic invasive plant species in the project area for the proposed alternatives. Example species include, but are not limited to, Chinese privet (*Ligustrum sinense*), Chinese tallow (*Sapium sebiferum*), common reed (*Phragmites australis*), Cogon grass (*Imperata cylindrica*), Japanese climbing fern (*Lygodium japonicum*), Japanese honeysuckle (*Lonicera japonica*), and others. A number of techniques are commonly utilized on the NWR and NERR, and at the nearby Sandhill Crane NWR, to accomplish invasive species management are incorporated by reference here (USFWS, 2007, USFWS, 2008, GBNERR, 2016). For example, prescribed fire is used for both reduction of fuel loads and invasive species management in fire suppressed pine savanna to promote grassy-herbaceous ground cover. For the purposes of discussion and to facilitate a programmatic impact analysis, invasive species management techniques would be divided into two categories, which are described below: 1) Chemical Treatment; 2) Mechanical Treatment; and Prescribed Fire would also be utilized as a restoration measure and management activity. Resource managers could use an integrated approach including a variety of techniques for site specific restoration and management measures depending on existing habitat conditions.

1) **Chemical Treatment:** Chemical treatments could include basal-bark application, cut stump treatments, foliar spray applications, and stem injection of herbicides to target eradication or control of invasive plant species. These applications are completed seasonally and typically occur in small target areas. Activities could require the vehicular transport of personnel into areas, use of approved herbicides, use of established safety and containment procedures, and the targeted application of herbicide in small areas. Personnel applying chemicals would follow all warning labels on chemical containers and proper permits would be secured prior to treatment activities. Treatments are typically done in areas that range from several acres up to 50 acres for a large-scale treatment by trained personnel. On Graveline Bay CP, chemical treatment would be limited to small areas within the 6-acre beach for treatment of common reed; the 115-acre beech magnolia forest; in 496 acres for fire-suppressed pine savanna; and selectively within the 66 acres of coastal small stream forest (avoiding streams and aquatic vegetation) for treatment of Chinese tallow, privet, Cogon grass, and other exotic invasive plant species.

2) **Mechanical Treatment:** Mechanical treatment is often used in combination with prescribed fire to restore and maintain openness, recycle nutrients, and reduce woody vegetation. Use of these techniques results in an increase in savanna species including sun-loving graminoids (grass-like plants) and forbs (flowering plants). Mechanical treatment could include removal of trees using commercial tree contracts, chain saws, bulldozing, and use of a bulldozer or gyro trac with roller chopper to remove shrubs and small trees or drum chopping to push over

and crush small, pre-commercial pines and shrubs. In wet areas, soft track or wide track equipment would be used to distribute the equipment weight and minimize ground disturbance. Alternatively, crews access areas on foot and may remove material with chainsaws, by hand, or with small tools. Replanting could also be part of invasive management operations. These techniques can be for large areas and are used successfully; several thousand acres of undesirable vegetation has been cleared by mechanical treatment in the Sandhill Crane NWR (USFWS, 2007). Mowing, tilling and disking are also used to prevent the spread of Cogon grass. For the proposed alternative, mechanical treatment would be used within 496 acres of fire-suppressed pine savanna and in 66 acres coastal plain small stream forests. Operations could occur over several seasons depending on the timing of acquisitions and other restoration priorities.

Prescribed Fire: Native habitats within the southeastern United States, including those within the project boundary, evolved in the midst of reoccurring, natural fires (USFWS, 2007, USFWS, 2008, GBNERR, 2016). These habitats therefore depend on a reoccurring fire schedule. Historically, natural fire occurred on a three to five-year interval. Fires were of low intensity, fueled by grasses and pine litter. Habitat management agencies in the project area successfully use prescribed fires to restore and maintain high quality, natural habitats. Prescribed fires reduce woody vegetation and tree encroachment in pine savanna habitat and can be effective in helping prevent the spread of certain exotic invasive species (e.g., Cogon grass and Chinese tallow), when used in combination with other methods (e.g., chemical and mechanical treatment). This project proposes to implement a schedule of prescribed fires on publicly owned property within the project boundary to accomplish habitat restoration and management goals. Wire grass, for example, is a fire-dependent savanna species. Only after being burned during the growing season will this grass produce seeds. Their complex system of underground roots and shoots helps them survive the fire. By increasing species such as this, the project is also expected to provide services to wildlife that use them, such as many declining populations of grassland bird species that rely on savanna habitat.[30] Prescribed fire and associated management within the project boundary would simulate these historic, natural fires.

Site preparation for a prescribed fire often involves compression of vegetation using equipment like roller choppers, gyro tracs, and excavators and/or other mechanical treatments included above to create habitat conditions which facilitate desired fires. Clearing, plowing and disking may be used to prepare fire breaks, zones devoid of fuel that border burn units and help manage fire boundaries. Fire could be applied using handheld drip torches to initiate prescribed fire. Aerial ignition from helicopters could also be used. Prescribed fires would follow standardized planning protocols and methodologies, such as considering environmental factors (certain weather, fuel and moisture conditions that would make the fire manageable[31]) and burning on a 2-3 year rotation during the

[30] https://www.fws.gov/refuge/Grand_Bay/what_we_do/resource_management.html
[31] https://www.fws.gov/mississippisandhillcrane/fire.html

growing season (Spring and Summer months, when possible). Prescribed fires could range in size depending on habitats and logistics, and Average prescribed burns fires at Grand Bay NWR are 79 acres, however, 20% of the Grand Bay burns fires may reach 100 acres or more. Prescribed fires average 59 acres at Mississippi Sandhill Crane NWR, however, 13% of those may reach 100 acres or more (USFWS 2005). For the proposed alternative, prescribe fire would applied to up to 496 acres of fire-suppressed pine savanna.

Debris Removal: Debris removal would include the use of equipment such as trucks, ATVs, bobcats, chainsaws and other equipment to remove debris such as dead vegetation, garbage, and other refuse. Debris would be disposed of properly at a landfill or other approved site. This would apply to up to 6 acres of beach, 115 acres of beech magnolia forest, 496 acres of fire-suppressed pine savanna, and 66 acres of coastal plain small stream forest.

Road Removal/Repair and Culvert Placement: These measures include roadbed and culvert removal/placement, filling and rerouting of drainage ditches, geotextile placement, ditch bank stabilization and other services needed to remove the roadbed. In addition, minor repair of the roadbed could also be required depending on site conditions. Roadbed material would be disposed of properly at a landfill or other approved site. Road repair/removal would apply to up to 4 acres of fire-suppressed pine savanna/coastal plain small stream forest. Best practices would be implemented including erosion control measures, re-contouring and revegetation of the roadbed after hard surface is removed.

Best Practices: The MS TIG would consider best practices referenced in Section 6.15 and Appendix 6A of the PDARP/PEIS to avoid and minimize impacts to resources during the implementation of restoration measures and management activities described above. Best practices listed in the PDARP/PEIS are intended to evolve as an adaptive management component of implementing the PDARP/PEIS; as such, the appendix to the PDARP/PEIS is a living document. As new best practices are established, existing best practices are refined, or new techniques and information are informed by implementation, these measures will be added to or updated in the relevant web sites identified in the appendix of the PDARP. In this capacity, new projects will have available the current range of best practices to support project design and implementation. In addition to PDARP/PEIS best practices, the MS TIG could develop best practices for site-specific restoration measures and management activities in different locations due to differences in relevant site conditions.

3.3.1 Alternative A (Preferred): Graveline Bay Land Acquisition and Management Affected Environment and Environmental Consequences

This section discusses Alternative A (Preferred), the Graveline Bay Land Acquisition and Management proposed alternative. For WCNH and Birds, Alternative A is one of two preferred alternatives that is proposed for implementation.

Graveline Bay Land Acquisition and Management (Proposed Action)
The proposed action includes acquisition of up to 1,410 acres of habitat in the vicinity of the Graveline Bay CP and restoration and management activities on up to 2,185 acres of the proposed alternative project area (existing CP and newly acquired parcels in the vicinity of the CP).

Management activities that are anticipated include access restriction, chemical treatment, mechanical treatment, prescribed fire, debris removal, road repair/removal and culvert placement.

3.3.1.1 Overview of Affected Environment and Environmental Consequences

This analysis incorporates by reference the relevant portions of Section 3.5.1 (Nearshore Ecosystem) of the PDARP/PEIS. The PDARP/PEIS provides programmatic evaluation of the environmental consequences of the restoration approaches "Protect and conserve marine, coastal, estuarine and riparian habitats" and "Restore and conserve bird nesting and foraging habitat", which are considered in this RP/EA. PDARP/PEIS evaluations from Sections 6.4.1.5 and 6.4.10.1 are incorporated by reference here. Tiering from that analysis, this section presents the Affected Environment of Graveline Bay and environmental consequences of the proposed actions in context of the project-specific affected environment.

The programmatic analysis looked at a series of resources as part of the biological, physical, and socioeconomic environment. As appropriate in a tiered analysis, the evaluation of each alternative focuses on the specific resources with a potential to be affected by the proposed project. To avoid redundant or unnecessary information, resources that are not expected to be affected are evaluated summarily in the respective sections. These resources include noise, marine and estuarine fauna, infrastructure, fisheries and aquaculture, marine transportation, and aesthetics and visual resources which will be discussed in Sections 3.3.1.2, 3.3.1.3, and 3.3.1.4.

3.3.1.2 Physical Environment

<u>Introduction to Affected Environment (Physical Environment)</u>: Geology and Substrates, Hydrology and Water Quality, and Air Quality and Greenhouse Gas Emissions are discussed in this section. PDARP/PEIS Sections 3.3.1, 3.3.2, 3.3.3 and 3.5.1 are incorporated by reference here. The affected environment for the proposed alternative physical environment is described in respective sections below.

<u>Programmatic Review of Environmental Consequences (Physical Environment)</u>: Sections 6.4.1.5.1 and 6.4.10.1.1 of the PDARP/PEIS describe the impacts to Physical Resources for the relevant restoration approaches and are incorporated by reference and briefly described here.

<u>PDARP/PEIS consequences related to geology and substrates and water resources</u>: Specific restoration activities identified as part of land management plans could result in short-term, minor to moderate adverse effects on geology, substrates, and water resources. Fire management may have short-term adverse impacts on soils, substrates, and air quality. Land acquisition could permit public access for recreational use which could result in short-term, minor to moderate adverse effects through increased soil compaction, rutting, or erosion caused by human presence and activity within the conservation area. Increased public use could result in short-term, minor effects on surface water through increased sedimentation. Fee title land acquisition could reduce disturbance of geology and substrates by protecting lands from development pressure. This would be a long-term beneficial effect that would extend beyond the life of the project. Where protected lands overlap ground water recharge zones, surface water, or brackish-water resources, water sources and water quality could be further protected from future degradation by helping to reduce runoff. Similarly, where protected land overlaps wetlands or shorelines, the protection of natural hydrologic processes could indirectly help

limit development and associated effects on water quality, including by way of saltwater intrusion. These would be long-term beneficial effects.

Environmental consequences for the proposed alternative are within the general range of impacts as described in the PDARP/PEIS with some variances related to specific actions. Table 3.3-3 summarizes the environmental consequences of the proposed alternative on the physical environment. Detailed analyses are provided below the summary table.

Table 3.3-3: Environmental Consequences to the Physical Environment Due to the Proposed WCNH and Birds Alternative A (Preferred).

Physical Environments	Acquisition/Preservation	Access restriction	Chemical treatment	Mechanical treatment	Prescribed fire	Debris removal	Road repair/removal and culvert placement
Geology and Substrates							
Adverse Impact Duration	long-term	short-term	short-term	short-term	short-term	short-term	short-term
Adverse Impact Intensity	minor	minor	minor	minor to moderate	moderate	minor	moderate
Beneficial Impact Duration	-	-	-	-	-	-	long-term
Hydrology and Water Quality							
Hydrology							
Adverse Impact Duration	-	-	short-term	short-term	short-term	-	short-term
Adverse Impact Intensity	-	-	minor	minor to moderate	minor to moderate	-	moderate
Beneficial Impact Duration	long-term	-	-	-	-	-	long-term
Water Quality							
Adverse Impact Duration	-	-	short-term	short-term	short-term	-	short-term
Adverse Impact Intensity	-	-	minor	minor to moderate	minor to moderate	-	moderate
Beneficial Impact Intensity	long-term	short-term	-	-	-	-	long-term
Floodplains							
Adverse Impact Duration	-	-	-	-	-	-	-

Physical Environments	Acquisition/Preservation	Access restriction	Chemical treatment	Mechanical treatment	Prescribed fire	Debris removal	Road repair/removal and culvert placement
Adverse Impact Intensity	-	-	-	-	-	-	-
Beneficial Impact Duration	long-term	-	-	-	-	-	long-term
Wetlands							
Adverse Impact Duration	-	-	short-term	short-term	short-term	short-term	short-term
Adverse Impact Intensity	-	-	minor	minor to moderate	minor to moderate	minor	minor to moderate
Beneficial Impact Duration	long-term	-	-	-	long-term	long-term	long-term
Air Quality and Greenhouse Gas Emissions							
Adverse Impact Duration	-	-	short-term	short-term	short-term	short-term	short-term
Adverse Impact Intensity	-	-	minor	minor	minor to moderate	minor	minor
Beneficial Impact Duration	-	-	-	-	-	-	-

As appropriate in a tiered analysis, the evaluation of the proposed alternative focuses on the specific resources with a potential to be affected. Noise impacts for the proposed alternative would be negligible to minor. To avoid redundant or unnecessary information, noise is evaluated here.

Noise: There would be short-term, minor, adverse noise impacts from equipment and operations associated with mechanical treatment, establishment of fire breaks, prescribed fire operations, and road repair/removal and culvert placement. Restoration activities would occur sporadically and seasonally and would be short in duration. Noise receptors in the area of the work would be buffered by forested areas between the receptor and the site of noise-producing activity. Acquisition and preservation of developable areas would provide a long-term benefit by reducing ambient noise pollution when compared to a build out scenario if property were developed. In addition, the following best practices would be implemented, to the extent practicable, for the selected alternative: minimize construction noise to the maximum extent practicable when working near protected species and their habitats.

For the physical environment, the following resources are further analyzed in this section:

- Geology and Substrates
- Water Quality and Hydrology
- Air Quality and Greenhouse Gas Emissions

3.3.1.2.1 Geology and Substrates

Affected Environment
Section 3.3.3 of the PDARP/PEIS discusses the geomorphological zones of the northern Gulf of Mexico. The proposed alternative is located within the Gulf Coastal Plain and the Mississippi Alluvial Plain physiographic regions. Seismic activity in the area of the proposed alternative is low. Since the late 1800s, about ten earthquakes large enough to be detected have occurred in the Gulf of Mexico. These earthquakes were mostly small-magnitude events (magnitudes of 3 to 4 on the Richter scale).

Landforms and substrates are generally comprised of Holocene sediments. These sediments are composed of sand, silt, and clay with comparatively high organic matter content. The coastal estuaries of Mississippi are composed of mostly sandy fine-grained sediment, silt and clays (Schmid 2015). The habitats can be divided into two classes - intertidal and subtidal. Intertidal zones (typical tidal range of 0.5 ft.) are generally composed of mud flats and small areas of natural sand beach. In general, the nearshore subtidal habitat is composed mostly of unconsolidated bottom types including sand, muddy sand, and mud bottom.

Data from the Mississippi State Geological Survey generally indicates that surface soils in the area of the proposed alternative consist of Holocene age coastal deposits of loam, sand, gravel, and clay. The USDA-NRCS Web Soil Survey identifies 14 soil-mapping units within the footprint of the proposed alternative. These soil map units located within the proposed alternative footprint area are listed on Table 3.3-4 (NRCS 2016). Of these soils, the Guyton silt loam and Handsboro association soil are listed as hydric and minor inclusions of the Atmore loam, 1 to 3 percent slopes; Benndale fine sandy loam, 0 to 2 percent slopes; Benndale fine sandy loam, 2 to 5 percent slopes; Smithton loam, 0 to 1 percent slopes, occasionally flooded; Ocilla loamy sand, 0 to 2 percent, occasionally flooded; Axis mucky sandy clay loam, frequently flooded; Handsboro mucky silt loam, frequently flooded; Bayou sandy loam, 0 to 1 percent slopes; and Harleston fine sandy loam, 0 to 2 percent slopes are listed as hydric (NRCS 2016a). Soils characteristics are listed in Table 3.3-4.

Table 3.3-4: Soils Characteristics in the project area for WCNH and Birds Alternative A (Preferred)**.**

Soil Type	Texture	Drainage Class
Atmore loam, 1 to 3 percent Slopes	Loam (upper) Loam (lower)	Poorly Drained
Benndale fine sandy loam, 0 to 2 percent slopes	Fine Sandy Loam (upper) Loam (lower)	Well Drained
Benndale fine sandy loam, 2 to 5 percent slopes	Fine Sandy Loam (upper) Loam (lower)	Well Drained
Smithton loam, 0 to 1 percent slopes, occasionally flooded	Loam (upper) Sandy Loam (lower)	Poorly Drained

Soil Type	Texture	Drainage Class
Escambia very fine sandy loam, 0 to 2 percent slopes	Very Fine Sandy Loam (upper) Loam (lower)	Somewhat Poorly Drained
Ocilla loamy sand, 0 to 2 percent, occasionally flooded	Loamy Sand (upper) Sandy Clay Loam (lower)	Somewhat Poorly Drained
Prentiss silt loam, 0 to 2 percent Slopes	Silt Loam (upper) Loam (lower)	Moderately well Drained
Wadley loamy sand, 0 to 5 percent slopes	Loamy Sand (upper) Sandy Clay Loam (lower)	Somewhat Excessively Drained
Axis mucky sandy clay loam, frequently flooded	Mucky Sand Clay Loam (upper) Sandy Loam (lower)	Very Poorly Drained
Handsboro mucky silt loam, frequently flooded	Mucky Silt Loam (upper) Muck (lower)	Very Poorly Drained
Bayou sandy loam, 0 to 1 percent slopes	Sandy Loam (upper) Sandy Loam (lower)	Poorly Drained
Harleston fine sandy loam, 0 to 2 percent slopes	Fine Sandy Loam (upper) Sandy Loam (lower)	Moderately well Drained
Harleston fine sandy loam, 2 to 5 percent slopes	Fine Sandy Loam (upper) Sandy Loam (lower)	Moderately well Drained
Latonia loamy sand, 0 to 2 percent slopes	Loamy Sand (upper) Sandy Loam (lower)	Well Drained

Environmental Consequences for WCNH and Birds Proposed Alternative A (Preferred)
Table 3.3-3 lists environmental consequences to geology and substrates of the activities associated with the Proposed Alternative A. There would be no adverse effect to geologic resources in the proposed alternative project area from acquisition/preservation, access restriction, chemical treatment, mechanical treatment, prescribed fire, debris removal or road repair/removal and culvert placement. A review of impacts to substrates (soils) is provided here.

Acquisition/Preservation: Acquisition and preservation would open new areas to recreational activities including hiking, fishing, bird-watching, and camping. Access using motorized vehicles would be limited. The increased public use could result in a long-term, minor, adverse impact to soils due to potential compaction, but these would be limited to relatively small areas.

Access Restriction: For beach habitat, barriers would be placed to restrict ATV and vehicle traffic to sensitive shoreline areas. During the placement of barriers and signage, small areas of soils would be disturbed and compacted by personnel and equipment. This would be a short-term, minor, adverse impact to soils.

Chemical Treatment: Treatment activities could require the use of ATVs, pickups or other small equipment that could result in soil disturbance, rutting and compaction. The use of equipment would result in a short-term minor adverse impact to soils. Removal of nuisance species and replanting could result in short-term, minor, adverse impacts to soils.

Mechanical Treatment: Activities include but would not limited to use of brush-hog, mowing, disking, and use of chainsaws. In addition, use of gyro tracks and in some cases bobcats or bulldozers to lay down or remove vegetation could be used. Turning over soils, soil compaction, disturbance and/or rutting from equipment use could result in short-term, minor to moderate, adverse impacts, depending on the size of the operation, soil wetness and season of the operation. To minimize these effects, care would be taken in the selection of equipment used and timing of operations, particularly in wetter soil conditions.

Prescribed Fire: Preparations for prescribed fires could include installation of fire breaks, and use of light to heavy equipment to fell or lay down woody underbrush. Fire breaks would be constructed around the boundary of the burn unit by mechanical treatment and or disking. Soils would be turned and would expose mineral underlayers. Soil could be disturbed and compacted during the prescribed fire operations due to equipment use. Vegetation laydown/removal operations using light to heavy equipment could result in soil disturbance or rutting. In wet areas, soft track or wide track equipment would be used to distribute the equipment weight and minimize impact. Alternatively, crews may remove material with chainsaws. There could be short-term, moderate adverse impacts from mineral soil exposure, rutting, and soil disturbance during the site preparation and prescribed fire operations.

Debris Removal: The use of equipment such as trucks, ATVs, bobcats, and other equipment to remove debris such as dead vegetation, garbage, and other refuse could cause compaction of the soil which would result in short-term, minor impacts.

Road repair/removal and culvert placement: Removal of road beds of up to 4 acres would require the use of excavation equipment, dump trucks, and other large equipment. Soils adjacent to the road bed may become compacted. Removing the roadbed would allow soils to return to a more naturally functioning state. Disturbed soils and road surfaces graded and prepared for revegetation. There would be short-term, moderate, adverse impacts to soils during road bed removal. Roadbed areas would be recontoured by disking and prepared for planting of native vegetation. The operations could provide long-term benefits to soils by restoring more historic hydrologic patterns to soils.

Best Practices

The MS TIG would consider best practices referenced in Section 6.15 and Appendix 6A of the PDARP/PEIS. Additional best practices may be recommended for site-specific restoration measures and management activities in different locations due to differences in relevant conditions. The following best practices are contemplated and would be implemented to the extent practicable in order to avoid and minimize impacts to geology and substrates (soils):

- Allow revegetation of fire breaks or actively revegetate with native species or annual grasses, if prolonged period of greening up is anticipated.
- Develop and implement spill prevention and response plan, including conducting daily inspections during chemical treatment, mechanical treatment and prescribed fire operations to ensure there are no leaks of antifreeze, hydraulic fluid, pesticides or other substances.
- To the extent practicable, for equipment use in wet areas, soft tracked or wide tracked equipment should be used to distribute the equipment weight and minimize impacts to soils. Alternatively, crews may remove vegetative material with chainsaws.

No Action Alternative
Under the No Action Alternative, the MS TIG would not implement any projects for the WCNH and Birds Restoration Types at this time, and would instead allow natural recovery processes to occur (outcomes described in Section 3.2). Natural recovery would take much longer compared to a scenario in which restoration actions were undertaken. Without NRDA funding for acquisition and preservation/management, these properties may be developed in the foreseeable future. If these properties were developed, adverse impacts to soils would be expected. The No Action Alternative does not meet the MS TIG's goals and objectives and does not provide restoration benefit to WCNH and Birds that would occur through Proposed Alternative A.

3.3.1.2.2 Hydrology and Water Quality

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. For the proposed alternative, the affected resources consist of shallow water within bays, bayous, and wetlands within Graveline Bay. Mississippi's water quality standards specify the appropriate levels for which various water quality parameters or indicators support a water body's designated use(s). Each use assessed for a water body is determined to be either "Attaining" or "Not Attaining" in accordance with the applicable water quality standards and U.S. Environmental Protection Agency (EPA) guidelines for assessments pursuant to Clean Water Act Section 305(b). A water body's use is said to be impaired when based on current and reliable site-specific data of sufficient quantity, quality, and frequency of collection it is not attaining its designated use(s). Where data and information of appropriate quality and quantity indicate non-attainment of a designated use or uses for an assessed water body, the water body will be placed on the Mississippi 2014 Section 303(d) List of Impaired Water Bodies (MDEQ 2014).

The proposed alternative is located in the Mississippi Coastal Streams watershed. This watershed has a drainage area of approximately 1,550 square miles (MDEQ 2014) and includes portions of Lamar, Hancock, Pearl River, Stone, Harrison, and Jackson counties. Major tributaries within the Mississippi Coastal Streams watershed include Bayou Casotte, Wolf River, Rotten Bayou, DeLisle Bayou, Bayou La Croix, Bayou Bacon/Jourdan River, Turkey Creek/Bernard Bayou, Biloxi River, and Tuxachanie Creek.

Major rivers carry high sediment loads into the Mississippi Sound. Inland fresh water drainage from these and other smaller rivers create an estuarine environment. Variable salinity levels can affect the productivity and survival of organisms living in the area, as well as economic and recreational activities. Pollution from agriculture, cities, improperly treated sewage, roadways, accidental oil spills, industrial discharges, and other sources also affect the health of the habitats. Graveline Bay is influenced by freshwater flow from several small tributaries. The waters in this area are classified by the State of Mississippi Water Quality Criteria for Intrastate, Interstate, and Coastal Waters (MDEQ 2012) as "shellfish harvesting", "recreation", and "fish and wildlife" (within Graveline Bay proper), and "recreation" and "fish and wildlife" for all other areas in the proposed alternative location. Commercial harvest of oysters is currently restricted in Graveline Bayou and Graveline Bay. None of the waterbodies that drain directly into Graveline Bay are listed as impaired on the State of Mississippi 303(d) list (MDEQ 2014).

Floodplains

The proposed alternative is in FEMA Federal Insurance Rate Maps 28059C0406G, 28059C0314G, and 28059C0405G. A large portion of the area is mapped as Zone VE. Zone VE is defined as Coastal flood zone with velocity hazard. This includes beach areas, open water and most estuarine marsh. Some estuarine marsh, streams, and riparian areas are mapped as Zone AE. Zone AE is defined as "Base Flood Elevations Determined". Upland areas are mostly Zone X. Zone X are defined as "Areas of 0.2% annual change flood; areas of 1% annual chance flood with average depths of less than 1 foot or with drainage areas less than 1 square mile; and areas protected by levees from 1% annual chance flood."

Wetlands

In general, estuarine areas within the proposed alternative are composed of low, mid, and high marsh zones. In the low marsh areas, regularly flooded by tidal activity, the area consists of mesohaline habitat. The intermediate (mid) marsh zone is irregularly flooded by tidal activity and is typically dominated by black needlerush (*Juncus roemerianus*), which can be intermixed with salt grass (*Distichlis spicata*) in oligohaline areas. In higher elevation areas, it is not uncommon to observe numerous species intermixed including salt grass, black needlerush, and salt meadow cordgrass (*Spartina patens*). Fire-suppressed pine savanna and coastal plain small stream forest habitat may be jurisdictional wetlands having prolonged durations of surface water hydrology in a depressional landscape context. Plant communities are discussed in Section 3.3.1.3 (Biological Environment).

Environmental Consequences for WCNH and Birds Proposed Alternative A (Preferred)

Environmental consequences affecting hydrology, water quality, floodplains, and wetlands are discussed below. Table 3.3-4 lists the environmental consequences of each proposed alternative activity to hydrology and water quality.

Hydrology and Water Quality

Acquisition/Preservation: Acquisition and preservation would open new areas to recreational activities including hiking, fishing, bird-watching, and camping. Access using motorized vehicles would be limited. Preservation of lands would have indirect, long-term benefits by preventing development and disturbances, which can reduce surface water runoff and result in long-term water quality benefits to the proposed alternative project area.

Access Restriction: Access restriction on Graveline beach would provide short-term benefits to water quality resulting from a decrease in disturbance/equipment use on the beach.

Chemical Treatment: Chemical treatment activities would include the use of herbicides. There could be unavoidable spills near the intended application area. However, best practices would be used to prevent any harmful chemicals from entering the environment. Implementation of best practices that the MS TIG would consider, described in the best practices summary below includes development and implementation of a spill prevention and response plan, including conduction daily inspections during chemical treatment to ensure there are no leaks of pesticides or other substances. Personnel applying chemicals would follow all warning labels on chemical containers and proper permits would be secured prior to treatment activities. As such this activity, would have short-term, minor, adverse impacts, if any, on water quality. There could be short-term, minor impacts to hydrology as a result of minor rutting/soil disturbance and temporary changes in hydrologic patterns from vehicular transport of personnel to treatment areas.

Mechanical Treatment/Prescribed Fire: Mechanical treatment would apply to up to 496 acres of fire-suppressed pine savanna and up to 66 acres of coastal plain small stream forest. Prescribed fire would apply on up to 496 acres of fire-suppressed pine savanna. Since large equipment may be needed, soil disturbance, rutting, compaction and any resulting erosion could have a short-term, minor to moderate, adverse impact to water quality. There could be small, temporary changes to stormwater flows and runoff retention patterns due to rutting by equipment and vegetation removal resulting in a short-term, minor to moderate adverse impact to hydrology. There would be short-term, minor to moderate, adverse impacts resulting from mechanical treatment of woody underbrush and construction of fire breaks. There could be small, temporary changes to stormwater flows and runoff retention patterns due to rutting by equipment and vegetation removal. Soft tracked or wide tracked equipment would be used in wet areas to the extent practicable. Alternatively, crews may access the area on foot and remove vegetative material with chainsaws or by hand or with small tools.

Debris removal: Debris removal could result in limited compaction and soil movement due to the use of equipment, and physical removal of debris. Impacts to water quality would be negligible. There would be no debris removal operation in water or in estuarine marsh.

Road repair/removal and culvert placement: Removal of road beds of up to four acres would require the use of excavation equipment, dump trucks, and other large equipment. Soils adjacent to the road bed could be disturbed or compacted from operations. Erosion control measures would be implemented during construction operations. Roadbed areas would be recontoured and prepared for revegetation. There could be short-term, moderate, adverse impacts to water quality during road bed removal as a result of construction-related sediment movement, and sedimentation of surrounding areas until vegetation is established on the disturbed area. Design of road repair/removal and culvert placement would include, to the extent practicable, efforts to restore historic hydrologic patterns. Road repair/removal and culvert placement could result in long-term, beneficial impacts to local hydrology and stormwater runoff patterns. The activity would result in long-term, water quality and hydrology benefits by restoring the natural hydrologic connection of the area surrounding the road.

Floodplains

Acquisition and preservation of land in perpetuity would prevent land development in floodplains. There would be a long-term benefit to floodplains. Chemical treatment, mechanical treatment and prescribed fire operations would not result in a detectable change to natural and beneficial floodplain values. Road removal/repair would restore natural hydrologic connectivity to areas adjacent to the roadways and would exchange compacted road surface with ground that would eventually be vegetated, providing a long-term benefit to floodplains.

Wetlands

Acquisition and Preservation: There would be a long-term benefit to wetlands from acquisition and preservation. Wet fire-suppressed pine savanna areas that are acquired would not be filled for development.

Access Restriction: Access restriction would occur on the Graveline beach. Barriers would not be placed in wetland areas. There would be no effect to wetlands as a result of this activity.

Chemical Treatment: Chemical treatment activities would require the use of herbicides and equipment during applications. Personnel applying chemicals would follow all warning labels on chemical containers and proper permits would be secured prior to treatment activities. Only chemicals approved for use in wetlands would be used. Equipment traffic in wetlands would be avoided to the extent practicable. Best practices would be used during the application of herbicides. Accidental spillage could result in minor, short-term adverse impacts to wetland habitat. However, best practices would be used to prevent any harmful chemicals from entering the environment and for clean up if a spill occurred.

Mechanical Treatment: Mechanical treatment in wetland areas would be done in a manner that would minimize impacts to wetlands to the extent practicable. If mechanical treatment is conducted in wetlands, soft track or wide track equipment would be used to distribute the equipment weight and minimize ground impacts. Alternatively, crews may remove material with chainsaws. If required, a USACE permit would be obtained; likely a Nationwide 27 (Aquatic Habitat Restoration, Establishment, and Enhancement Activities) as well as MDMR Coastal Wetlands Permit (if required). Nationwide 27 allows for mechanized land clearing to remove non-native invasive, exotic or nuisance vegetation and other related activities. If there is clearing within wetlands or stream boundaries, damage to vegetation, soil compaction and any resulting erosion could have a short-term, minor to moderate impacts to wetlands. USACE permit and/or MDMR Coastal Wetlands permit conditions (if required) would be adhered to in all operations.

Prescribed Fire: Prescribed fire would apply to up to 496 acres of fire-suppressed pine savanna, a portion of which, are likely wetlands. Intermittent fires were historically a critical perturbation for this habitat. There would be short term minor to moderate impacts to wetlands resulting from mechanical treatment of woody underbrush and construction of fire breaks if the fire breaks are in wetlands or streams. Permit requirements and minimization measures are discussed above in mechanical treatment. There would be long-term beneficial effects to wet fire-suppressed pine savannas including a re-establishment of wetland communities, and increased diversity in flora and faunal populations that colonized the prescribed fire unit.

Debris Removal: Debris removal from wetlands would be completed in a manner that would not substantially disturb or redistribute soils including avoidance of equipment in saturated areas and hand removal by field crews. Debris removal could have short-term, minor, adverse impacts to wetlands. Debris removal would have a long-term beneficial impact to wetlands.

Road repair/removal and culvert placement: Removal of road beds of up to 4 acres would require the use of excavation equipment, dump trucks, and other large equipment. Removing the roadbed would allow wetlands to return to a more naturally functioning state. There could be short-term, minor to moderate impacts to surrounding wetlands and streams during road bed removal as a result of increased erosion and sedimentation until vegetation is established. There would be a long-term, wetland benefit from culvert placement if design of the project enhances natural historic hydrologic patterns. Clean Water Act Section 404 permits would be obtained from USACE, as required. All activity would be conducted in compliance with applicable permit conditions. Erosion control and spill prevention measures would be implemented during construction activities.

Best Practices
The MS TIG would consider best practices referenced in Section 6.15 and Appendix 6A of the PDARP/PEIS. Additional best practices may be recommended for site-specific restoration measures and management activities in different locations due to differences in relevant conditions. The

following best practices are contemplated and would be implemented to the extent practicable in order to avoid and minimize impacts to water quality and hydrology:

- In the execution of land acquisition and the design of habitat management measures the MS TIG would consider resiliency measures to facilitate habitat migration due to sea level rise.
- To avoid water quality impacts an erosion control plan will be developed and could consist of the use of vegetative buffers (100 feet or greater), revegetation with native species or annual grasses, and any other measures needed to prevent sediment from reaching protected species or their habitats.
- For chemical treatment, personnel applying chemicals would follow all warning labels on chemical containers and proper permits would be secured prior to treatment activities. Personnel will apply herbicide in accordance with the direction and guidance provided on the appropriate U.S. Environmental Protection Agency (EPA) labels and state statutes during land-based activities.
- Soft track or wide track equipment would be used in wet areas to the extent practicable. Alternatively, crews may remove vegetative material with chainsaws.
- Avoid and minimize, to the maximum extent practicable, placement of dredged or fill material in wetlands and other aquatic resources. Design construction equipment corridors to avoid and minimize impacts to wetlands and other aquatic resources to the maximum extent practicable. If required, a USACE permit and/or MDMR Coastal Wetlands Permit would be obtained; likely a Nationwide 27 (Aquatic Habitat Restoration, Establishment, and Enhancement Activities) as well as MDMR Coastal Wetlands Permit (if required). USACE permit and/or MDMR Coastal Wetlands permit conditions (if required) would be adhered to in all operations.
- Designate a vehicle staging area removed from any natural surface water resource or wetland to perform fueling, maintenance, and storage of construction vehicles and equipment. Inspect vehicles and equipment daily prior to leaving the storage area to ensure that no petroleum or oil products are leaking.
- Develop and implement a spill prevention and response plan, including conducting daily inspections of all construction and related equipment to ensure there are no leaks of antifreeze, hydraulic fluid, or other substances and cleaning and sealing all equipment that would be used in the water to rid it of chemical residue.
- Control dust related to construction site activities through a Soil Erosion Sediment Control Plan that includes spraying of a suppressing agent on dust piles (non-hazardous, biodegradable).
- Cover trucks hauling loose materials.

No Action Alternative

Under the No Action Alternative, the MS TIG would not implement any projects for the WCNH and Birds Restoration Types at this time, and would instead allow natural recovery processes to occur (outcomes described in Section 3.2). Natural recovery would take much longer compared to a scenario in which restoration actions were undertaken. Without NRDA funding for acquisition and preservation/management, these properties may be developed in the foreseeable future. If these properties were developed, there would likely be adverse effects on hydrology, water quality, floodplains, and wetlands. Adverse hydrologic affects could include increased runoff rates due to impervious surfaces related to development. Increases in sediment entering waterways could result in adverse effects to water quality. Floodplain and wetland function could be adversely affected by development of parcels proposed for acquisition, preservation and management under proposed Alternative A. The No Action Alternative does not meet the MS TIG's goals and objectives and does not provide the restoration benefit to WCNH and Birds that would occur through Proposed Alternative A.

3.3.1.2.3 Air Quality and Greenhouse Gas Emissions

Affected Environment
The following section is a discussion of air quality for the proposed alternative project area. EPA has set national ambient air quality standards (NAAQS) for six principal air pollutants (also called criteria pollutants): Ground-Level Ozone (O3), Particulate Matter (PM), Nitrogen Dioxide (NO2), Sulfur Dioxide (SO2), Carbon Monoxide (CO), and Lead (Pb). MDEQ is the state agency responsible for development and maintenance of state specific air emission standards for Mississippi, and monitors all of these pollutants. In Jackson County, the following parameters are monitored: Ozone, Particulate Matter, Nitrogen Oxides, and Sulfur Dioxide. According to MDEQ 2015 Air Quality Data Summary[32] the entire state of Mississippi, including Jackson County, is meeting all of the NAAQS.

Environmental Consequences for WCNH and Birds Proposed Alternative A (Preferred)
The environmental consequences for this section is divided into two discussions: 1- environmental consequences resulting from equipment operation/best practices and; 2- environmental consequences resulting from prescribed fire/best practices.

<u>1-Environmental Consequences Resulting from Equipment Operation/Best Practices</u>: The following proposed alternative implementation activities would produce emissions during equipment operation: chemical treatment, mechanical treatment, and road repair/removal and culvert placement. Because these restoration activities would occur seasonally, and would be limited in scope and distribution, the adverse impacts on air quality or to emissions of greenhouse gases would be short-term and minor.

Best Practices
Unavoidable short-term, minor adverse impacts from equipment emissions would be offset through the following best practices to the extent practicable:

- Shut down idling construction equipment, if feasible.
- Encourage the use of the proper size of equipment for the job to maximize energy efficiency.
- Use of ultra-low sulfur diesel fuel in off-road construction equipment with engine horsepower (HP) rating of 60 HP and above.

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[32] http://www.deq.state.ms.us/mdeq.nsf/pdf/Air_2015AirQualityDataSummary/$File/2015%20Air%20Quality%20Data%20Summary.pdf?OpenElement (MDEQ 2015)

2- Environmental Consequences Resulting from Prescribed Fire/Best Practices: The use of prescribed fire is included in this project as a restoration activity to provide major long-term benefits for native species habitats, water and soil quality, and nutrient cycling.[33] However, short-term minor to moderate adverse impacts to air quality and greenhouse gases may occur during the prescribed fire. Smoke emissions are primarily composed of water vapor and carbon dioxide but also contains carbon monoxide, nitrogen oxide, hydrocarbons, particulate matter, and trace minerals. According to the National Coalition of Prescribed Fire Councils Guide to Smoke Management (September 2007 version),[34] the primary concerns of smoke as an air pollutant are as follows:

- Carbon Dioxide: The emission factor for carbon dioxide for prescribed burning is 2,000-3,500 pounds/ton (pounds of emissions/ton of organic matter burned).
- Carbon monoxide: The emission factor for carbon monoxide for prescribed burning is 20-500 pounds/ton. It is classified as a criteria pollutant by EPA. Because of rapid dilution and its instability, carbon monoxide emissions from prescribed burning are not a concern to the general public.
- Water vapor: The emission factor for water vapor for prescribed burning is 50-1500 pounds/ton. The only possible concern about water vapor is visibility reduction in the vicinity of the fire.
- Particulate matter: The emission factor for particulate matter for prescribed fire is 20-180 pounds/ton. Particulates are a criteria pollutant and can impact health and visibility. Particulates are presently the major pollutant of concern from prescribed burning. They represent a health risk by inhalation and also reduce visibility.
- Hydrocarbons: The emission factor for hydrocarbons for wildland fire is 10-40 pounds/ton. While hydrocarbons are not a criteria pollutant, they may impact health and visibility and in some cases, may contribute to excessive ozone concentrations.
- Nitrogen oxides: The emission factor for nitrogen oxides for wildland fire is 1-9 pounds/ton. Nitrogen oxides are a criteria pollutant and can impact health and visibility. The low emission factor reduces concern of ambient air quality standards on a local level; however, nitrogen oxides can affect ozone formation.
- Secondary emissions: Secondary emissions are pollutants which are formed in the atmosphere by photochemical transformation of primary emissions. They include oxidants such as ozone which is a criteria pollutant. Specific emission factors from prescribed fire are unknown but are believed to be relatively small.
- Air Toxics: There is an emerging concern about the potential emission of air toxics including acetaldehyde, acrolein; 1, 3 butadiene; formaldehyde; and polycyclic organic matter (POM). POM includes eight major categories of compounds including polycyclic aromatic hydrocarbons (PAHs) which include numerous chemicals emitted from fire.

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[33] https://www.nrcs.usda.gov/Internet/FSE_DOCUMENTS/16/stelprdb1046311.pdf (NRCS 2015)
[34] http://www.garxfire.com/pdf%20files/The_National_Coalition_of_Prescribed_Fire_Councils_Guide_to_Smoke_Management.pdf (The national Coalition of Prescribed Fire Councils 2007)

Adverse impacts to air quality by prescribed fires would be minimized by the frequency and timing of the events; typically, they would be conducted every 1-3 years on managed prescribed fire areas per the management plan. Unavoidable short-term minor to moderate adverse impacts from prescribed fire would be offset through the development of a Prescribed Fire Plan, which would include some or all the following Best Smoke Management Practices (BSMPs) and would be part of the management plan. These BSMPs (October 2011) were developed by USDA Forest Service/NRCS[35] to mitigate the impacts of smoke to public health (See Section 3.3.1.4.5), public safety and nuisance, and visibility. These six BSMPs have applicability depending on the type of fire, fuel to be burned, and level of effort needed to address air quality concerns. BSMPs are utilized by the individual fire manager and may be an expectation of a state-wide smoke management program and any applicable conservation plans which are in place for the proposed alternative area (Table 3.3-5).

Table 3.3-5: Summary of Basic Smoke Management Practices.

Basic Smoke Management Practice	Benefit achieved with the BSMP	When the BSMP is Applied
Evaluate Smoke Dispersion Conditions	Minimize smoke impacts	Before, During, After
Monitor Effects on Air Quality	Be aware of where the smoke is going and degree it impacts air quality	Before, During, After
Record-Keeping/Maintain a Burn/Smoke Journal	Retain information about the weather, burn and smoke. If air quality problems occur, documentation helps analyze and address air regulatory issues	Before, During, After
Communication- Public Notification	Notify neighbors and those potentially impacted by smoke, especially sensitive receptors	Before, During
Consider Emission Reduction Techniques	Reducing emissions can reduce downwind impacts	Before, During
Share the Airshed Coordination of Area Burning	Coordinate multiple burns in the area to manage exposure of the public to smoke	Before, During, After

No Action Alternative

Under the No Action Alternative, the MS TIG would not implement any projects for the WCNH and Birds Restoration Types at this time, and would instead allow natural recovery processes to occur (outcomes described in Section 3.2). Natural recovery would take much longer compared to a scenario in which restoration actions were undertaken. Without NRDA funding for acquisition and preservation/management, these properties may be developed in the foreseeable future. If these properties were developed, there would likely be adverse impacts to air quality due the potential of development, the additional traffic and other air pollution related to development, and removal of vegetation that benefits air quality. Under the No Action Alternative, prescribed fire would not take

[35] https://www.nrcs.usda.gov/Internet/FSE_DOCUMENTS/16/stelprdb1046311.pdf (NRCS 2015)

place as an additional management activity, resulting in no additional short-term, minor to moderate impacts to air quality from prescribed fire. This short-term impact however would be offset by the potential for development with its resultant potential for long-term impacts. The No Action Alternative does not meet the MS TIG's goals and objectives and does not provide the restoration benefit to WCNH and Birds that would occur through Proposed Alternative A.

3.3.1.3 Biological Environment

Introduction to Affected Environment (Biological Environment): Habitats, Wildlife and Protected Species are discussed in this section PDARP Sections 3.4.3.5, and 3.6 are incorporated by reference here. The affected environment for the proposed alternative biological environment is described in respective sections below.

Programmatic Review of Environmental Consequences (Biological Environment): Sections 6.4.1.5.2 and 6.4.10.1.2 of the PDARP describe the impacts to Biological Resources for the restoration approaches relevant restoration approaches and are incorporated by reference and briefly described here.

PDARP/PEIS consequences related to land management plans: Specific restoration activities identified as part of land management plans could result in short-term, minor to moderate adverse effects on conservation areas. Consequences reviewed in the PDARP/PEIS are incorporated here and summarized.

PDARP/PEIS consequences related to invasive species: Activities that may occur on conserved lands may result in introduction of invasive species. Use of best practices would help prevent the introduction of invasive species. Implementation of land management plans, located within or near restoration activities, could result in disturbed, removed, or altered habitats, which could cause minor to moderate, short- and long-term adverse effects on species that use those habitats for forage or nesting purposes.

PDARP/PEIS consequences related to public access: Land acquisition could permit public access for recreational use. This public use, depending on management stipulations, could result in long-term, minor to moderate adverse effects on area species through increased human presence and activity on acquired habitats.

PDARP/PEIS consequences related to habitat: Conservation of habitat through fee title acquisition and improved management could have a long-term benefit to any habitat on the property acquired or protected. Conservation would also allow for upland migration of beach, wetland, or other habitats as the sea level rises and could limit development encroachment.

PDARP/PEIS consequences related to habitat and resource benefits: Conservation of habitat through fee title acquisition could have a long-term benefit to fish, birds, and terrestrial wildlife through the protection of coastal, riparian, or terrestrial habitat. These habitats can be important for food supply and various life stages of some species. Benefits of the proposed restoration approach include conservation of bird nesting and foraging habitat that would increase bird health and reproduction by preventing habitat loss through land conversion.

PDARP/PEIS consequences related to access restriction: Restrictions on seasonal or overall human use that could result from changes in land management would reduce habitat degradation. Improvements in habitat associated with this approach may draw additional visitors to the area, resulting in potential indirect adverse impacts from human presence. Human disturbance can lead to failure of nests, increased egg and chick predation, or even total colony abandonment.

PDARP consequences related to vegetation management: Managing vegetation is a common restoration technique to enhance habitat for specific bird species. Reducing vegetation on beaches, for example, can provide nesting and foraging habitat for birds such as such as snowy plover, least tern, black skimmer, and American oystercatcher. Conversely, adding vegetation can provide habitat for other bird species such as wading birds and brown pelicans. Common vegetation management methods include mechanical treatments, application of pesticides or herbicides, and biological control to manage plant species.

Environmental consequences for the proposed alternative are within the general range impacts as described in the PDARP/PEIS with some variances related to specific actions. Table 3.3-6 summarizes the environmental consequences to the biological environment that would result from the proposed alternative. These impacts to these resources is discussed below.

Table 3.3-6: Environmental Consequences to the Biological Environment (Habitats) due to the Proposed WCNH and Birds Alternative A (Preferred).[36]

Biological Environments	**Acquisition/Preservation**	**Access Restriction**	**Chemical Treatment**	**Mechanical Treatment**	**Prescribed Fire**	**Debris Removal**	**Road Removal/Repair and Culvert Placement**
Beach							
Adverse Impact Duration	-	short-term	short-term	-	-	-	-
Adverse Impact Intensity	-	minor	minor	-	-	-	-
Beneficial Impact Duration	long-term	long-term	short-term	-	-	short-term	-
Beech-Magnolia Forest							

[36] Protected species are not included in this table and are addressed in Section (3.3.1.3.2).

Biological Environments	Acquisition/Preservation	Access Restriction	Chemical Treatment	Mechanical Treatment	Prescribed Fire	Debris Removal	Road Removal/Repair and Culvert Placement
Adverse Impact Duration	-	-	short term	-	-	short term	-
Adverse Impact Intensity	-	-	minor	-	-	minor	-
Beneficial Impact Duration	long-term	-	long-term	-	-	short-term	-
Fire Suppressed Pine Savanna							
Adverse Impact Duration	-	-	short-term	short-term	short-term	short-term	short-term
Adverse Impact Intensity	-	-	minor	minor to moderate	minor to moderate	minor	moderate
Beneficial Impact Duration	long-term	-	long-term	long-term	long-term	short-term	long-term
Coastal Plain Small Stream Forest							
Adverse Impact Duration	-	-	short-term	short-term	short-term	short-term	-
Adverse Impact Intensity	-	-	minor	minor to moderate	minor to moderate	minor	-
Beneficial Impact Duration	long-term	-	long-term	long-term	long-term	short-term	-
Estuarine Marsh							
Adverse Impact Duration	-	-	-	-	-	-	-
Adverse Impact Intensity	-	-	-	-	-	-	-
Beneficial Impact Duration	long-term	-	-	-	-	-	-
Invasive Species							
Adverse Impact Duration	-	-	-	-	-	-	-

Biological Environments	Acquisition/Preservation	Access Restriction	Chemical Treatment	Mechanical Treatment	Prescribed Fire	Debris Removal	Road Removal/Repair and Culvert Placement
Adverse Impact Intensity	-	-	-	-	-	-	-
Beneficial Impact Duration	-	-	long-term	long-term	long-term	-	-
Wildlife Species (including birds)							
Adverse Impact Duration	-	-	short-term	short-term	short-term	short-term	short-term
Adverse Impact Intensity	-	-	minor	minor to moderate	minor to moderate	minor	minor
Beneficial Impact Duration	long-term	long-term	long-term	long-term	long-term	short-term	long-term

As appropriate in a tiered analysis, the evaluation of the proposed alternative focuses on the specific resources with a potential to be affected. Marine and estuarine fauna are not expected to be affected by the proposed alternative as there is no in-water work. To avoid redundant or unnecessary information, marine and estuarine fauna are evaluated summarily here.

Marine and Estuarine Fauna (Submerged Aquatic Vegetation, Nearshore Benthic Invertebrates, Marine Mammals, and Essential Fish Habitat): There would be no in-water work. Estuarine marsh would be acquired and preserved, but there are no management activities planned in this habitat in the proposed alternative project area. Acquisition and preservation of habitat would prevent development and preclude habitat removal or stresses that could result from shoreline development.

For the biological environment, the following resources are further analyzed in this section:

- Habitats
- Protected Species
- Migratory Birds
- Wildlife

3.3.1.3.1 Habitats

The section includes habitats found in the proposed alternative area and the environmental impacts from restoration activities that would be implemented in those habitats.

Affected Environment

Section 3.5 of the PDARP/PEIS provides a discussion of habitats of the northern Gulf of Mexico; Section 3.7.4 covers invasive species. This section covers habitats in the proposed alternative project area. The Mississippi Sound extends along the southern coasts of Mississippi and Alabama. The Mississippi Sound is separated from the Gulf of Mexico by several narrow barrier islands and sand bars (including Cat Island, Ship Island, Horn Island, and Petit Bois Island), which provide dynamic and diverse habitats especially for over 300 species of migratory or permanent resident bird species (USACE 2009). Along the Mississippi Sound, there are numerous coastal bays including St. Louis Bay, Biloxi Bay, Back Bay of Biloxi, Pascagoula Bay, Graveline Bay and Grand Bay. The Mississippi Sound is shallow with water depths generally not exceeding 20 ft. Water is exchanged with the Gulf of Mexico through the openings between the barrier islands. This partially protected nature and the influx of riverine freshwater create a salinity gradient within the Sound (Priddy et al. 1955). This delicate mix of fresh and salt water provides a suitable habitat for oysters, shrimp, and other fisheries. Christmas and Waller (1973) reported 138 fish species in 98 genera and 52 families taken from areas across the Mississippi Sound. Vittor and Associates (1982) identified over 437 taxa of macrofauna from the sound with densities varying from approximately 1,200 to 38,900 individuals per square yard.

Graveline Bay and waterways represent one of only a few relatively undisturbed estuarine bays and small tidal creeks in Mississippi. It is located between Grand Bay to the east and Biloxi Bay to the west. The area supports salt marsh, brackish marsh, and several degraded oyster beds (which are intended to be restored under a *DWH* Early Restoration Project). This shallow, coastal bay/marsh estuarine system receives only local freshwater runoff and consists largely of black needle rush dominated marsh along its entire length. Smooth cordgrass occurs largely as narrow (1 to 3 m) bands along the waterways. Subtidal ecological communities/habitats include muddy sand embayment, small tidal creeks and mollusk reefs. Intertidal ecological communities/habitats include sand beach, mesohaline marsh, and oligohaline marsh. Much of the marsh area is already part of the MDMR CP Program.

Within the proposed alternative area, coastal wetland and nearshore habitats include estuarine marsh, beach, beech-magnolia forest, coastal plain small stream forest, fire suppressed pine savanna, and open water including tidal creeks and bayous (Figure 3.3-2).

Estuarine Marsh: Approximately 1,218 acres of estuarine marsh exists within the proposed alternative area, 636 acres are in private ownership. Estuarine marsh consists largely of black needle rush dominated marsh along its entire length. Smooth cordgrass (*Spartina alterniflora*) occurs largely as narrow (1-3 m) bands along the creeks and bayous.

Beach: Approximately 6 acres of natural beaches of the Graveline area are located directly adjacent to the Mississippi Sound. The most common winds are from the southwest, but the dominant (highest velocity) winds are out of the southeast, setting up longshore transport and also onshore (overwash) transport. A significant amount of the overall sediment transport occurs during tropical storms, moving significant quantities of sediment alongshore and onshore.[37] Sandy material is also distributed and deposited by westward longshore currents. The beach habitat also exhibits soft, easily erodible marsh terraces directly in front of the beach deposits. Currently, the beach is primarily unvegetated with common reed as a dominant on the northern interface between the beach and marsh. Beach habitat is used as nesting habitat by the diamondback terrapin (*Malaclemys terrapin*) on a regular basis as well as several solitary nesting shorebird species. There has been one recorded atypical use of this site by a nesting loggerhead turtle (*Caretta caretta*).

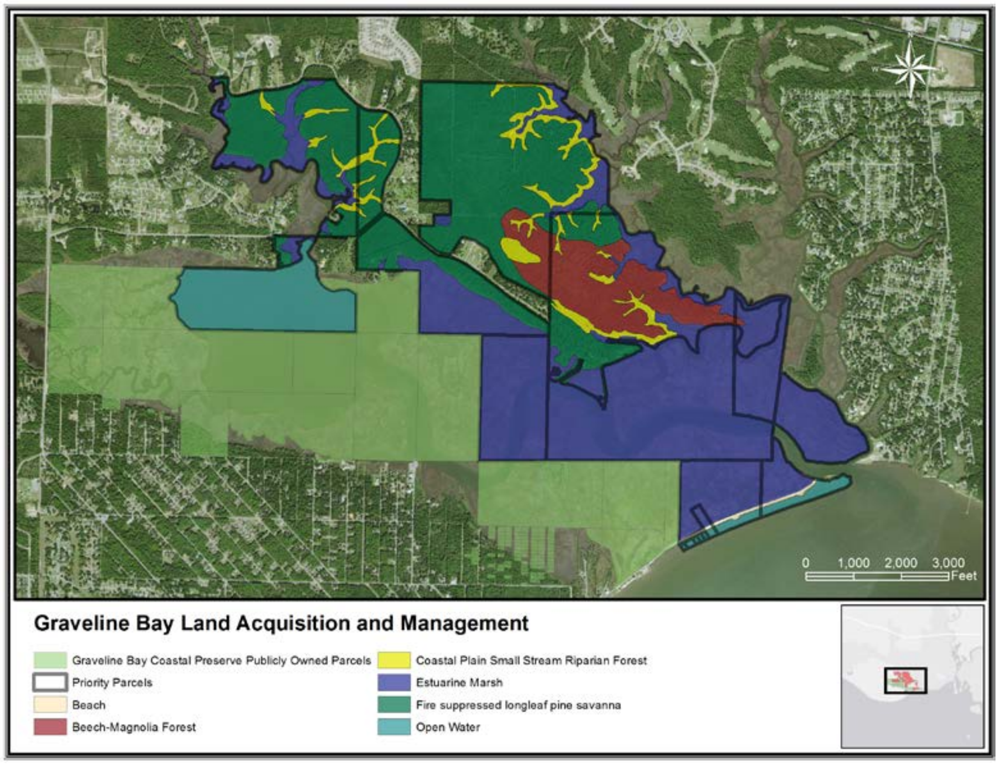


Figure 3.3-2: Habitats in the Graveline Bay Land Acquisition and Management Proposed Project Area.

<u>Beech-Magnolia Forest</u>: Approximately 115 acres of beech magnolia habitat exists within the proposed alternative area including the public owned parcels in the CP and the acquisition parcels in and adjacent to the CP. The Beech-Magnolia forest community occurs in transitional areas from upland longleaf pine high relief areas to stream bottoms. American beech (*Fagus grandifolia*) and magnolias (*Magnolia grandiflora*) are the dominant trees of the canopy, but the forested community can be very diverse with several species of hardwoods (e.g., oaks) and pines also occurring. This community represents the climax community of this ecoregion (MMNS 2015).

[37] Sediment Transport Study, Graveline Bayou, Gautier, Jackson County, Mississippi August 2015.

Coastal Plain Small Stream Forest: Coastal plain small stream swamp forests are alluvial swamps along small drainages. In the proposed alternative area, there is a total of 66 acres of this habitat. Their floodplains are often protected by a dense mat of interwoven tree roots, traversed by braided streams. Sweetbay (*Magnolia virginiana*) and water tupelo (*Nyssa aquatic*) are the most common trees. Red maple (*Acer rubrum*), and water oak (*Quercus nigra*) are also common (MMNS 2015). The understory of these habitats remains open with regular fires, but quickly becomes overgrown by rapidly growing shrubs such as swamp titi, buckwheat tree, and large gallberry in the absence of fire.

Fire Suppressed Pine Savanna: Approximately 496 acres of fire suppressed pine savanna exists in the proposed alternative project area. In Mississippi, the historical longleaf pine forest extended from the wetlands of the coast to the mixed pine- hardwood forests of central Mississippi and from the border of Alabama to the Loess Hills. Natural fires maintained forests and savannas of massive, well-spaced longleaf pine trees. Combustible leaf litter and grassy understory carried natural wildfires through the longleaf region. Sampling of virgin forests over a century ago indicated that tree densities averaged about 100 per acre, or 400 square feet per tree. In the absence of frequent burns, other pines, hardwood trees and shrubs rapidly move into these longleaf pine savannas. In addition, many of the areas were planted in faster growing species such as slash pine (*Pinus elliotii*). In just a few years, the midcanopy and shrub layers of this community can become thick and impenetrable, eliminating natural regeneration of the shade-intolerant longleaf seedlings. If left unaltered, this community succeeds to an oak-hickory-pine community on drier sites and to beech-magnolia in mesic areas (MMNS 2015). If managed, wetter pine savannas can have a diverse community of carnivorous plants including pitcher plants (*Sarracenia alata*), sundews (*Drosera spp.*) and in ponding areas, bladderwort (*Utricularia* sp.).

Open Water: Approximately 485 acres of open water exists in the proposed alternative project area. Graveline Bay is tidally influenced, with wide ranging salinities levels. Graveline Bay supports subtidal and intertidal oysters and is a popular fishing area.

Invasive Species EO 13112 applies to all federal agencies whose actions may affect the status of invasive species, requires agencies to identify such actions, and to the extent practicable and permitted by law, requires agencies to 1) take actions specified in the Order to address the problem consistent with their authorities and budgetary resources and 2) not authorize, fund, or carry out actions that they believe are likely to cause or promote the introduction or spread of invasive species in the United States or elsewhere unless pursuant to guidelines that it has prescribed, the agency has determined and made public its determination that the benefits of such actions clearly outweigh the potential harm caused by invasive species; and that all feasible and prudent measures to minimize risk of harm will be taken in conjunction with the actions. The proposed alternative habitat management is primarily invasive species management with restoration actions and measures including chemical treatment, mechanical treatment and prescribed fire. Best practices that would be used to control or eliminate invasive species are discussed in the environmental consequences section below.

Environmental Consequences for WCNH and Birds Proposed Alternative A (Preferred)
A summary of proposed restoration activity and adverse and beneficial impacts are listed in Table 3.3-6 and discussed in this section.

Estuarine Marsh**:** Acquisition and preservation of habitat would prevent development and preclude habitat removal or stresses that could result from site development. There would be a long-term benefit to acquiring estuarine marsh.

Beach**:** Acquisition/preservation, access restriction, chemical treatment for common reed and debris removal would be conducted on this habitat. Acquisition and preservation of habitat would prevent development. There would be short-term, minor, adverse impacts resulting from the installation of barriers on the beach. Access restriction would allow the beach to recover from current use impacts and would protect shorebird habitat, providing long-term benefits. For chemical treatment of common reed management, there could be minor impacts to adjacent vegetation from the misapplication in the intended area and incidental spillage of chemicals. Personnel applying chemicals would follow all warning labels on chemical containers and proper permits would be secured prior to treatment activities. Chemical treatment could result in short-term, minor impacts to habitat. Chemical treatment would have a short-term beneficial impact by preventing the spread of common reed. Debris removal would have a short-term beneficial effect on beach habitat.

Beech-Magnolia Forest**:** Acquisition/preservation, chemical treatment, and debris removal would be conducted on this habitat. Acquisition and preservation of habitat would prevent development, habitat loss and fragmentation. This would result in a long-term benefit to the habitat. Equipment use during chemical treatment and debris removal could result in short-term minor impacts to habitat. The restoration activities would have a beneficial impact by preventing the spread of invasive species and restoring native species composition. This would result in a long-term benefit to the habitat. Debris removal would have a short-term benefit to Beech-magnolia forest.

Fire-Suppressed Pine Savanna**:** Acquisition/preservation, chemical treatment, mechanical treatment, prescribed fire, debris removal, and road removal/repair and culvert placement would be conducted on this habitat. Acquisition and preservation of habitat would prevent development, habitat loss and habitat fragmentation. Acquisition and preservation provide a long-term benefit to the habitat.

Chemical Treatment could result in short-term, minor impacts from equipment use and incidental spillage of herbicide, both localized to small areas. Eradication and control of invasive species (such as torpedo grass [*Panicum repens*]) using chemical treatment would result in a long-term benefit to this habitat.

Mechanical Treatment/Prescribed Fire: Activities include but would not limited to use of brush-hog, and use of chainsaws. In addition, use of gyro tracs and in some cases bobcats or bulldozers to lay down or remove vegetation could be used as a stand-alone treatment or in combination/preparation for prescribed fire. The preferred prescribed fire regime would be completed, ideally, on a two-year rotation, with 50% of the prescribed fires occurring during the growing season. Weather conditions, seasonal wetness, availability of trained staff, invasive species present and other factors are considerations in maintaining the fire frequency; 1-3 years. These activities would largely be applied in areas that were colonized by woody invasive and understory shrubs such as gallberry (*Ilex glabra*), privet, saw palmetto, Chinese tallow, and other species. Impacts to soils and wetlands were discussed in previous section. These could result in short-term, minor to moderate, adverse impacts, to existing habitats depending on the size of the operation. There would be long-term benefits to fire suppressed savannas from mechanical treatment alone or in combination with prescribed fire by creating conditions that would result in the re-establishment of diverse plant communities.

Debris Removal: There could be short-term, minor, adverse impacts from equipment related to debris removal in fire-suppressed pine savannas. There would be a short-term beneficial affect from debris removal.

Road Removal/Repair and Culvert Placement: Equipment used for road removal/repair and culvert placement would result in short-term, moderate impacts to habitat. The equipment would cause disturbance to vegetation and soils adjacent to existing roads, which would temporarily impact habitats. The impacts would be adjacent to up to 4 acres of roadway constituting a moderate impact. The restoration activities would have a long-term, beneficial impact which include restoring historic hydrologic conditions beneficial to fire-suppressed pine savannas.

Coastal Plain Small Stream Forest**:** Acquisition/preservation, debris removal, and road removal/repair and culvert placement would be conducted on this habitat. The adverse and beneficial impacts described in fire-suppressed pine savanna for these activities would apply here.

Open Water**:** There would be no work in open water. Therefore, no adverse or beneficial impacts would result.

Best Practices
The MS TIG would consider best practices referenced in Section 6.15 and Appendix 6A of the PDARP/PEIS. Additional best practices may be recommended for site-specific restoration measures and management activities in different locations due to differences in relevant conditions. The following best practices are contemplated and would be implemented to the extent practicable in order to reduce the spread of invasive species:

- Prior to bringing any equipment (including personal gear, machinery, vehicles, or vessels) to the work site, inspect each item for mud or soil, seeds, and vegetation. If present, clean the equipment, vehicles, or personal gear until they are free from mud, soil, seeds, and vegetation.
- Inspect the equipment, vehicles, and personal gear each time they are being prepared to go to a site or prior to transferring between sites to avoid spreading exotic, nuisance species.

No Action Alternative
Under the No Action Alternative, the MS TIG would not implement any projects for the WCNH and Birds Restoration Types at this time, and would instead allow natural recovery processes to occur (outcomes described in Section 3.2). Natural recovery would take much longer compared to a scenario in which restoration actions were undertaken. Without NRDA funding for acquisition and preservation/management, these properties may be developed in the foreseeable future. If these properties were developed, there would likely be adverse impacts to habitats including habitat removal and/or fragmentation. The No Action Alternative does not meet the MS TIG's goals and objectives and does not provide the restoration benefit to WCNH and Birds that would occur through Proposed Alternative A.

3.3.1.3.2 Protected Species

Affected Environment
Section 3.6 of the PDARP/PEIS discusses biota of the northern Gulf of Mexico. This section covers threatened and endangered species in the proposed alternative area. The USFWS and NOAA National

Marine Fisheries (NMFS) list species as threatened or endangered when they meet criteria detailed under the Endangered Species Act of 1973 (ESA), as amended (16 U.S.C. § 1531 *et seq*.). Additionally, Mississippi Department of Wildlife, Fisheries, and Parks (MDWFP) identifies and lists protected species. Section 7(a)(2) of the ESA requires that each federal agency ensure that any action authorized, funded, or carried out by the agency is not likely to jeopardize the continued existence of any endangered or threatened species or result in the destruction or adverse modification of Critical Habitat of those species. When the action of a federal agency may affect a protected species or its Critical Habitat, that agency is required to consult with either the NMFS or the USFWS, depending upon the protected species that may be affected.

To fulfill requirements and obligations under the ESA, the Marine Mammal Protection Act of 1972 (MMPA), the Migratory Bird Treaty Act (MBTA) and the Bald and Golden Eagle Protection Act (BGEPA), the MS TIG completed and submitted Biological Evaluation Forms to NOAA and USFWS for compliance with Section 7 of the ESA of 1973, as amended (16 U.S.C. § 1531 et seq.), and Section 101 of the MMPA, as amended (16 U.S.C. 1371(a)(5) et seq.). The USFWS Ecological Services Field Office, Jackson, MS concurred by letter dated April 5, 2017 (USFWS 2017) that the project is not likely to adversely affect piping plover, red knot, West Indian manatee, Mississippi sandhill crane, Alabama red-belly turtle, black pine snake, gopher tortoise, Louisiana quillwort, and loggerhead sea turtle (terrestrial). By memorandum dated March 29, 2017, the NOAA Restoration Center, Southeast Region determined that the proposed project will not affect Essential Fish Habitat (EFH) because there is no EFH in the project area or EFH will not be affected by proposed actions. By memorandum dated March 29, 2017, the NOAA Restoration Center, Southeast Region determined that the proposed project will have no effect on listed species under the jurisdiction of NMFS (NMFS 2017). The MS TIG coordinated with the USFWS and NOAA NMFS to determine that this project does not require authorization under the MMPA. Compliance with the MBTA, and the BGEPA are also discussed in this section.

Relevant federally protected species that are known to occur or could occur in Jackson County and that could occur in or near the proposed alternative project area or could pass through the proposed alternative project area are listed in Table 3.3-7. A brief discussion of the state imperiled diamond back terrapin is also provided in the environmental consequences.

Table 3.3-7: Federally threatened, endangered, and proposed species in the project area for WCNH and Birds Proposed Alternative A (Preferred).

Common Name	Scientific Name	Federal Status	Habitat
Birds			
Piping plover	*Charadrius melodus*	Threatened	Beaches and mudflats in southeastern coastal areas. Critical Habitat, MS-15, exists in Jackson County but is not in the proposed alternative area. Piping plover have been known to utilize Graveline beach for non-nesting activities.
Red knot	*Calidris canutus rufa*	Threatened	Marine intertidal habitats including inlets, estuaries, and bays feeding in mud and sand flats on beaches and barrier islands
Mississippi sandhill crane	*Grus canadensis pulla*	Endangered	Open wetland habitats surrounded by shrubs or trees. Critical Habitat has been established on and adjacent to the Mississippi Sandhill Crane National Wildlife Refuge (USFWS 2013).

Common Name	Scientific Name	Federal Status	Habitat
Fishes			
Gulf sturgeon	*Acipenser oxyrinchus desotoi*	Threatened	Migrates from large freshwater coastal rivers to brackish and marine coastal bays and estuaries. Graveline beach is adjacent to Critical Habitat Unit 8, but there would be no in-water work in Critical Habitat.
Mammals			
West Indian manatee	*Trichechus manatus*	Endangered	Fresh and salt water in large coastal rivers, bays, bayous and estuaries
Bottlenose dolphin	*Tursiops truncatus*	Protected	Bays, estuaries and river mouths as well as offshore
Reptiles			
Hawksbill sea turtle	*Eretmochelys imbricate*	Endangered	Coral reefs, open ocean, bays, estuaries
Leatherback sea turtle	*Dermochelys coriacea*	Endangered	Open ocean, coastal waters
Kemp's ridley sea turtle	*Lepidochelys kempii*	Endangered	Nearshore and inshore coastal waters, often in salt marshes; neritic zones with muddy or sandy substrate (NOAA Fisheries 2014b)
Green sea turtle	*Chelonia mydas*	Threatened	Shallow coastal waters with SAVs and algae, nests on open beaches
Loggerhead sea turtle	*Caretta*	Threatened	Open ocean; also inshore areas, bays, salt marshes, ship channels and mouths of large rivers
Alabama red-belly turtle	*Pseudemys alabamensis*	Endangered	Fresh and brackish habitats, river banks, submerged and emergent aquatic vegetation; upland habitat for nesting (MDWFP 2001; USFWS 2013)
Black pine snake	*Pituophis melanoleucus lodingi*	Threatened	Open canopy longleaf pine forest with herbaceous ground cover and well-drained sandy soils and, less so, hardwood forests (USFWS 2010).
Gopher tortoise	*Gopherus polyphemus*	Threatened	Well-drained, sandy soils, which allow easy burrowing; an abundance of diverse herbaceous ground cover; and an open canopy and sparse shrub cover, which allows sunlight to reach the ground floor (USFWS 2013).
Plants			
Louisiana quillwort	*Isoetes louisianensis*	Endangered	Perennial streams and banks in bottomland hardwood habitats likely with bald cypress and possibly the presence of stream macrophytes such as *Sparganium* spp. and *Orontium* spp. (USFWS 2012)

Birds

Mississippi Sandhill Crane (*Grus canadensis pulla*): The Mississippi Sandhill crane utilizes open wetland habitats surrounded by shrubs or trees. Critical Habitat has been designated on and adjacent to the Mississippi Sandhill Crane National Wildlife Refuge (USFWS 2013).

Piping Plover (*Charadrius melodus*): The piping plover does not nest in Mississippi; however, this species uses Gulf Coast beaches and barrier islands for wintering (MDWFP 2001). Plovers use sparsely vegetated sand beaches, mudflats, and salt marshes for roosting and foraging.

Red Knot (*Calidris canutus rufa*): In coastal Mississippi, the red knot is mainly a migratory species that uses coastal beaches and marine intertidal areas as stopover feeding locations or staging areas on the way to and from their wintering grounds in South America and breeding areas in the Arctic. Foraging on ocean beaches, mud and sand flats, and salt marshes occurs from March to April during the northward spring migration and September and October during the southward autumn migration (Niles et al. 2007; USFWS 2013). Red knots have been observed wintering on the Gulf Coast and are observed from October to March (USFWS 2013). The nonbreeding diet of this species includes marine invertebrates such as snails, crustaceans, and small mollusks including the coquina clam *(Donax variabilis),* which is common on Gulf coast beaches, and the dwarf surf clam *(Mulinia lateralis)* (Niles et al. 2007; USFWS 2013). Roosting and resting habitat includes areas above the high tide line such as reefs and high sand flats (USFWS 2013).

Fishes

Gulf Sturgeon (*Acipenser oxyrinchus desotoi*): This anadromous species migrates from coastal bays and estuaries to large coastal rivers in the spring for spawning and then returns to brackish and marine environments from October through March for foraging. The riverine spawning habitats for Gulf sturgeon in the State of Mississippi include the Mississippi, Pearl, and Pascagoula rivers (Ross et al. 2009; MDWFP 2001) but not the Biloxi and Tchoutacabouffa rivers (USFWS, GSMFC, and NMFS 1995; NMFS and USFWS 2009). The marine wintering areas where individuals have been observed are nearshore and barrier island habitats from the Pearl River east to the barrier islands (Ross et al. 2009). Winter habitat is mainly around Cat, Ship, Horn, and Petit Bois islands with nearshore observations likely due to migratory movements to and from these offshore islands (Rogillio et al. 2007; Ross et al. 2009). The coastal Mississippi Sound waters of the State of Mississippi are designated as Critical Habitat.

Gulf Sturgeon Designated Critical Habitat: The proposed alternative area is adjacent to Gulf sturgeon Critical Habitat at the mouth of Graveline Bayou/along Graveline beach (Unit 8-Lake Pontchartrain-Mississippi Sound). There would be no in-water work during the implementation of the proposed alternative.

Mammals

West Indian Manatee (*Trichechus manatus*): This species uses both fresh and saltwater habitats such as coastal rivers, bays, bayous, and estuaries. The manatee is an occasional visitor to Mississippi's coasts, although migration into the area is poorly understood. After wintering in Florida, and perhaps Mexico, manatees migrate northward during spring, including to Mississippi and Alabama waters, although these migrations are not well understood (Fertl et al. 2005). Manatees frequently seek out freshwater sources such as rivers and river mouths and have been known to be found near estuaries (Fertl et al. 2005). SAVs are the typical manatee forage material; however, manatees can also consume other aquatic vegetation, algae, and terrestrial vegetation (Fertl et al. 2005). There are no proposed restoration activities in open water.

Bottlenose Dolphin (*Tursiops truncatus*): Bottlenose dolphins are a protected species found in temperate and tropical waters around the world. There are coastal populations that migrate into bays, estuaries and river mouths as well as offshore populations that inhabit pelagic waters along the continental shelf. There are no proposed restoration activities in open water.

Reptiles

Hawksbill Sea Turtle (*Eretmochelys imbricata*): Although this species uses various habitats such as the open ocean, bays, and estuaries throughout different life stages, it is mainly associated with coral reefs. This species nests in Florida from April to November (NOAA Fisheries 2014a). It likely does not nest in Mississippi and observations are rare in the state (MDWFP 2001; NOAA Fisheries 2014a). The main dietary items of this species are sponges and other invertebrates (NOAA Fisheries 2014a). There are no proposed restoration activities in open water.

Leatherback Sea Turtle (*Dermochelys coriacea*): This species mainly inhabits the offshore open ocean; however, it does use nearshore coastal waters during nesting or feeding. Nesting for this species occurs in Florida from April through November. Their main forage item is jellyfish. This species migrates long distances from nesting to feeding areas. While not common, there have been sporadic observations of leatherback sea turtles in Mississippi waters (MDWFP 2001). There are no proposed restoration activities in open water.

Kemp's Ridley Sea Turtle (*Lepidochelys kempii*): Typical habitat for this species includes nearshore and inshore coastal waters and often salt marshes and neritic zones with muddy or sandy substrate (NOAA Fisheries 2013b). This species has been observed in nearshore waters of the Mississippi Sound during migration and foraging and has been accidentally caught by shore-based fishermen (MDWFP 2001; Shaver and Rubio 2008). Females typically nest from May through July (NOAA Fisheries 2014b). Males potentially use Gulf of Mexico habitats all year and females presumably use the Mississippi Sound and barrier island habitats for foraging when not nesting (NOAA Fisheries 2014b). Kemp's ridley sea turtles do not nest in Mississippi (MDWFP 2001). There are no proposed restoration activities in open water.

Green Sea Turtle (*Chelonia mydas*): This species typically prefers shallow coastal waters with SAVs and algae for foraging and nests on open beaches (NOAA Fisheries 2015). Nesting typically does not occur on mainland beaches and there is likely no Mississippi nesting at all (MDWFP 2001; NOAA Fisheries 2015). This species migrates long distances in the open ocean from nesting to feeding areas. Observations of this species in Mississippi are rare (MDWFP 2001). There are no proposed restoration activities in open water.

Loggerhead Sea Turtle (*Caretta caretta*): Loggerhead habitat for foraging and migration includes open ocean, inshore areas, bays, salt marshes, ship channels, and mouths of large rivers. This sea turtle feeds on mollusks, fish, crustaceans, and other marine organisms. This species typically nests at night from late April through September (NOAA Fisheries 2014c). Although loggerheads occasionally use barrier islands for nesting, mainland nesting is rare (MDWFP 2001). Preferences for nesting beaches include high-energy coarse-grained beaches adjacent to the ocean that are narrow and steeply sloped (NOAA Fisheries 2014c). This species has been observed in nearshore waters of the Mississippi Sound during migration and foraging and has been accidentally caught by shore-based fishermen (MDWFP 2001). There was one atypical nesting event on Graveline beach. There are no proposed restoration activities in open water.

Alabama Red-Belly Turtle (*Pseudemys alabamensis*): The habitat of the Alabama red-belly turtle includes fresh and brackish habitats, river banks, submerged and emergent aquatic vegetation, and upland habitat for nesting (MDWFP 2001; USFWS 2013). This species is mainly a freshwater species associated with river and stream channels and associated wetlands. Nesting occurs from mid-May to mid-July (MDWFP 2001).

Mississippi Diamondback Terrapin (*Malaclemys terrapin pileata*): The Mississippi diamondback terrapin (*Malaclemys terrapin pileata*) utilizes pocket beaches adjacent to marsh for nesting habitat (Frey 2014). Diamondback terrapins have a diet of fish, snails, worms, clams, crabs and marsh plants and live in brackish water habitats such as estuaries and tidal marshes, preferring marshes with nearby channels. Juveniles may spend first few years under mats of flotsam or vegetation (Ernst et al. 1994). Clutches are laid from April to August. The Mississippi diamondback terrapin is ranked by MDWFP as S2: Imperiled in Mississippi (Mississippi Natural Heritage Program 2015). Restoration activities will not be done on pocket beaches.

Black Pine Snake (*Pituophis melanoleucus lodingi*): Suitable habitat includes open canopy longleaf pine forest with herbaceous ground cover and well-drained sandy soils and, less so, hardwood forests (USFWS 2010). Much of the habitat in the proposed alternative area is not suitable because of dense canopy cover or due to existing disturbance.

Gopher Tortoise (*Gopherus polyphemus*): The Gopher tortoise uses well-drained to excessively well-drained upland soils. Tortoises require soils that are sandy enough to permit construction of burrows and open canopies that allow sufficient herbaceous plant growth and sunny areas in which to nest. In Mississippi, these areas often support a mixture of longleaf pine and scrub oaks.

Plants

Louisiana Quillwort (*Isoetes louisianensis*): The Louisiana quillwort has been observed in 10 counties in 174 streams within 17 watersheds (USFWS 2012a) throughout the State of Mississippi with the largest colony found in the DeSoto National Forest (USFWS 2012a). This species is found in all three coastal Mississippi counties (MDWFP 2001; USFWS 2012a) although none have been found near the proposed alternative area (MDWFP 2001). In coastal Mississippi, Louisiana quillwort habitat includes perennial streams and banks in bottomland hardwood habitats likely with bald cypress and possibly the presence of stream macrophytes such as *Sparganium* spp. and *Orontium* spp. (USFWS 2012a). Earlier sources indicate that suitable habitat for this species consists of sand or gravel bars located in intermittent streams and associated riparian areas (MDWFP 2001). Louisiana Quillworts are sensitive to changes in hydrology, sedimentation, and alterations to the surrounding overstory (USFWS 2012a).

Environmental Consequences for WCNH and Birds Proposed Alternative A (Preferred)

PDARP/PEIS programmatic ESA consultations were developed with the National Marine Fisheries Services (NMFS 2016) and the U.S. Fish and Wildlife Service (USFWS 2016). Potential impacts to threatened or endangered species and their Critical Habitat are presented in Table 3.3-8. The MS TIG has completed coordination under the programmatic ESA consultations with the USFWS (USFWS 2017) and with NMFS (NMFS 2017). The southeast portion of the project area is adjacent to the Mississippi Sound which is designated Critical Habitat for Gulf sturgeon. None of the restoration activities would be completed in open water. Thus, there would be no effect as a result of any restoration activity to in water species (and associated Critical Habitat), including Gulf sturgeon, West Indian manatee, Bottlenose dolphin, and sea turtles; for this reason, they are not included in the environmental consequences discussion in Table 3.3-8.

Table 3.3-8: Protected Species Environmental Consequences for the WCNH and Birds Proposed Alternative A.

Species /Critical Habitat	Applicable Habitats	Restoration Activities for Applicable Habitats	Potential Impacts to Species/Critical Habitat
Alabama red-belly turtle (*Pseudemys alabamensis*)	Estuarine marsh and fire-suppressed savanna	• Acquisition/Preservation • Chemical treatment • Mechanical treatment • Prescribed fire • Debris removal • Road removal/repair and culvert placement	Restoration measures and management activities could affect species habitat. If there is potential habitat for the Alabama red-belly turtle, surveys would be conducted in potential habitat. Survey results would be considered in the design of the restoration measures and management activities to either avoid or minimize impacts to the species. Actions to minimize the potential for adverse effects include, but are not limited to, those listed in the Best Practices Summary Table (Appendix A) including erosion control and spill prevention plans. As such, the project is not likely to adversely affect the species.
Piping plover *(Charadrius melodus)* and Red knot *(Calidris canutus rufa)*	Beach	• Access restriction • Acquisition/preservation • Chemical treatment • Debris removal	Restoration measures and management activities are not likely to adversely impact these species because they can vacate the area during implementation. This project is intended to have beneficial impacts to piping plover and red knot by maintaining and enhancing beach habitat.
Black pine snake *(Pituophis melanoleucus lodingi)*	Fire-suppressed pine savanna	• Acquisition/Preservation • Chemical treatment • Mechanical treatment • Prescribed fire • Debris removal • Road removal/repair and culvert placement	It is not likely that this habitat exists in the proposed alternative area because much of the habitat is characterized by dense canopy cover or existing disturbance. However, if the habitat does exist, prescribed fire and mechanical treatment of upland areas may affect species habitat. Surveys would be conducted in areas where the species is likely to occur. Survey results would be considered in the design of the management activities and restoration measures to either avoid or minimize impacts to the species. As such, the project is not likely to adversely affect the species
Gopher tortoise *(Gopherus polyphemus)*	Fire-suppressed pine savanna and beech magnolia forest	• Acquisition/Preservation • Chemical treatment • Mechanical treatment • Prescribed fire • Debris removal • Road removal/repair and culvert placement	Restoration measures and management activities could affect species habitat. Areas that are likely to contain the species will be surveyed; if burrows are identified, conservation measures detailed in the Best Practices Summary Table (Appendix A) will be implemented to avoid or minimize impacts. As such, the project is not likely to adversely affect the species.

Species /Critical Habitat	Applicable Habitats	Restoration Activities for Applicable Habitats	Potential Impacts to Species/Critical Habitat
Louisiana quillwort (*Isoetes louisianensis*)	Coastal plain small stream forest	• Acquisition/Preservation • Chemical treatment • Mechanical treatment • Debris removal • Road removal/repair and culvert placement	Restoration measures and management activities could affect the species. If mechanical or chemical treatment, road removal/repair, or culvert placement will be conducted within 165 feet of Louisiana quillwort suitable habitat (ephemeral, intermittent, 1st and 2nd order perennial freshwater streams), then a qualified biologist will conduct a survey for Louisiana quillwort. If debris removal is in Louisiana quillwort suitable habitat, a survey will be performed prior to debris removal operations. If the species is found, then protective measures outlined in the Best Practices (listed below) will be implemented. As such, the project is not likely to adversely affect the species.
Mississippi sandhill crane *(Grus canadensis pulla)*	• Coastal plain small stream forest • Estuarine marsh • Fire-suppressed savanna	• Acquisition/Preservation • Chemical treatment • Mechanical treatment • Debris removal • Road removal/repair and culvert placement • Prescribed Fire	Restoration measures and management activities could affect the species. If disturbed, this species can temporarily leave the area during the implementation of restoration measures and management activities. As such, the project is not likely to adversely affect the species.
Mississippi Diamondback terrapin (*Malaclemys terrapin pileata)*	Estuarine marsh and beach	• Access restriction • Chemical treatment • Debris removal Acquisition/preservation	Restoration measures and management activities in estuarine marsh and in pocket beaches, where the species nests, would be limited to acquisition and preservation.

Best Practices

The MS TIG would consider best practices referenced in Section 6.15 and Appendix 6A of the PDARP/PEIS, and in the Best Practices listed below. Additional best practices may be recommended for site-specific restoration measures and management activities in different locations due to differences in relevant conditions. The MS TIG would continue to consult with the appropriate regulatory agency to further avoid or minimize impacts to these species in the planning site-specific restoration measures and management activities. The following best practices derived from informal consultation with the USFWS (USFWS 2017a) would be implemented to the extent practicable in order to avoid and minimize impacts to protected species:

Alabama Red-Belly Turtle

Surveys be conducted in potential habitat. Survey results would be considered in the design of the restoration measures and management activities to either avoid or minimize impacts to the species. Best management practices outlined in applicable erosion control plans and applicable spill prevention plans will be implemented to minimize the indirect impacts.

Black Pine Snake

Exemptions under Section 4(d) of the Endangered Species Act allow the following management activities within habitats occupied by the black pine snake: (1) Prescribed burning, including all fire break establishment and maintenance actions, as well as actions taken to control wildfires; (2) Herbicide application for invasive plant species control, site-preparation, and mid-story and understory woody vegetation control. All exempted herbicide applications must be conducted in a manner consistent with Federal law, including Environmental Protection Agency label restrictions; applicable State laws; and herbicide application guidelines as prescribed by herbicide manufacturers and; (3) All forest management activities that maintain lands in a forested condition, except for: (a) Conversion of longleaf-pine-dominated forests (>51 percent longleaf in the overstory) to other forest cover types or land uses; or (b) those activities causing significant subsurface disturbance, including, but not limited to, shearing, wind-rowing, stumping, disking (except during fire break creation or maintenance), root-raking, and bedding. Areas requiring mechanical treatment such as shearing, wind-rowing, stumping, disking, root raking and bedding are typically dominated by invasive woody shrub and tree species and are not suitable habitat (open canopy settings) for black pine snake. An assessment of habitat would be completed. Surveys would be conducted of areas that have potential black pine snake habitat. The results would be considered in the design of the management and or restoration measures to avoid or minimize impacts to the species. The Implementing Trustee would coordinate with the Jackson Field Office if help is needed on habitat identification of habitat, conducting of surveys and/or the development of practices on a site-specific restoration plan.

Gopher Tortoise

A qualified biologist will conduct gopher tortoise surveys in areas that have suitable habitat and if burrows are identified, the following conservation measures will be implemented to avoid or minimize impacts:

- Mechanical Treatment
  To the extent practicable, vegetation clearing within 13 feet of a gopher tortoise burrow would be conducted but with hand tools (i.e., weed trimmer, push mower, chainsaws). In specific cases where the hand tool restriction imposes additional costs and time required to maintain mowed areas, the specific provisions for mowing operations with bush-hog or rotary cutters within 13 feet of active and inactive gopher tortoise burrows during the dormant season only (October through April) are as follows: the path of the tractor and mower will be directed so that tires do not cross directly over the burrow entrance, or plane of the underground burrow. However, tractors and mowers of sufficient width can be backed or pulled directly over the burrow apron, entrance, and its underground plane by straddling the wheels on either side of the burrow and apron. Whenever possible, mowing should be conducted in the winter to reduce the likelihood of gopher tortoises being active above ground. If practical, mowing should be planned for cloudy days when the temperatures are coolest. Heavy equipment will stay 14 M (13 ft.) from known gopher tortoise burrows. Heavy equipment includes tractors, crawler loaders, crawler dozer, backhoe/loader, front end loader, scraper pan, monitor grader, skid steers, forklift, hydraulic excavator, specialty tracked equipment, gyrotracks with roller choppers, and other equipment. Do not place or operate logging decks within 186 feet of an active or inactive burrow, the area where tortoises normally forage from their burrows. Do not sheer, root-

rake, disc, and bed or create windrows in habitat occupied by tortoises, which is represented as a 2.5-acre area with a radius of 186 feet around any active burrow.

- Chemical Treatment
  All motorized equipment should be kept a minimum of 4 Meters (13 ft.) from gopher tortoise burrows and herbicide applications should be conducted on foot. For foliar herbicide application to control shrubs and small hardwoods, use imazapyr, glyphosate, and/or triclopyr by directed ground spray if prescribed fire is not feasible or is ineffective due to inadequate fuel loads, unmanageable smoke hazards, prescribed fire permit bans and restrictions, or low expected mortality due to the size, density, and cover of shrubs and hardwoods. Do not aerially apply these or other herbicides. Revegetation - for artificial regeneration, do not plant more than 500 seedlings per acre. Design all practices in gopher tortoise habitat to minimize or avoid unintentional damage to non-target plants. This applies to all practices where vegetation is managed such as the use of herbicides or site prep/harvest equipment.

- Road Repair/Removal and Culvert Replacement/Debris Removal
  Equipment limitation mentioned above would apply to theses restoration measures and management activities.

Louisiana Quillwort

If the restoration measure or management activity (i.e. mechanical or chemical treatment, and prescribed fire) will be conducted within 165 feet of Louisiana quillwort suitable habitat (ephemeral, intermittent, 1st and 2nd order perennial freshwater streams), then a qualified biologist will conduct a survey for Louisiana quillwort. If Louisiana quillwort is found, then the following protective measures should be adopted: No herbicides will be mixed or applied within 100 feet of Louisiana quillwort plants/colonies. Minimize turbidity and siltation from upstream and upslope land clearing activities. No land clearing will occur within 165 feet of streams containing Louisiana quillwort. Heavy equipment will not be used within a 165 ft. buffer area of Louisiana quillwort plants/colonies.

Piping Plover and Red Knot

Provide all individuals working on a restoration activities associated with the project with information in support of general awareness of piping plover or red knot presence and means to avoid birds and their critical or otherwise important habitats. Minimize vegetation planting in preferred habitats and avoid removal of wrack year-round along the shoreline.

Chemical Treatment

For chemical treatment, personnel applying chemicals would follow all warning labels on chemical containers. Personnel will apply herbicide in accordance with the direction and guidance provided on the appropriate U.S. Environmental Protection Agency (EPA) labels and state statutes during land-based activities.

Herbicides should not be applied within 60 feet of any endangered or threatened plant species (or plant species of concern), unless analysis indicates herbicide use is the best way to protect the species from invasive weeds or promote the species, and application methods are selective to the target plants being treated.

Prescribed Burn

Planning and implementation of prescribed burns should include measures to provide protection for known occurrences of threatened, endangered, sensitive, and locally rare species that are susceptible to damage or extirpation from fire injury.

All Restoration Measures

Erosion control measures should be applied in all ground-disturbing activities to reduce movement of bare soil and minimize direct delivery of sediment to streams or other water-bodies (including estuarine systems). Appropriate erosion control measures (installing water diversion, revegetation, mulch, silt fences, etc.) should be implemented as promptly as practical.

Planning and implementation of fire break construction, and other ground disturbing projects should include measures to provide protection for threatened, endangered, sensitive, and locally rare species that are susceptible to damage or extirpation from ground disturbance. These are referred to as "species sensitive to soil disturbance and species sensitive to recreational traffic."

Provide all individuals working on restoration activities associated with the project with information in support of general awareness of and means to avoid impacts to protected species and their habitats present at the specific project site. ESA Section 7 consultation has been completed and the appropriate recommendations are incorporated into the proposed alternative. Because no effects to manatee are expected, the Implementing Trustees determined that no take of manatee under ESA or MMPA would occur.

No Action Alternative

Under the No Action Alternative, the MS TIG would not implement any projects for the WCNH and Birds Restoration Types at this time, and would instead allow natural recovery processes to occur (outcomes described in Section 3.2). Natural recovery would take much longer compared to a scenario in which restoration actions were undertaken. Without NRDA funding for acquisition and preservation/management, these properties may be developed in the foreseeable future. If these properties were developed, there would likely be adverse impacts to habitat that could be utilized by protected species. Habitats that protected species could use would not be protected from development under the No Action Alternative and would not be managed for increased habitat benefits. The No Action Alternative does not meet the MS TIG's goals and objectives and does not provide the restoration benefit to WCNH and Birds that would occur through the Proposed Alternative A.

3.3.1.3.3 Migratory Birds

Affected Environment

Migratory bird species groups that could occur in the alternative project area include wading birds, shorebirds, seabirds, raptors, goatsuckers, waterfowl, doves and pigeons, and rails and coots (see Table 3.3-9).

Table 3.3-9: Species Groups Present in the Project Area for WCNH and Birds Proposed Alternative A.

SPECIES	BEHAVIOR	SPECIES/HABITAT IMPACTS
Wading birds (herons, egrets, ibises)	Foraging, feeding, resting, roosting, nesting	Wading birds primarily forage and feed at the water's edge. As such, they may be impacted locally and temporarily by the proposed alternative. It is expected that they would be able to move to another nearby location to continue foraging, feeding and resting. These birds primarily nest and roost in trees or shrubs (e.g., pines, Baccharis), and could utilize areas that will be managed by mechanical treatment and prescribed fire. Nesting surveys would be conducted before commencing restoration activities.
Shorebirds (plovers, oystercatchers, stilts, sandpipers)	Foraging, feeding, resting, roosting, nesting	Shorebirds forage, feed, rest, nest and roost in the proposed alternative area. As such, they may be impacted locally and temporarily by the proposed alternative. It is expected that they would be able to move to another nearby location to continue foraging, feeding and resting. In the proposed alternative area, these birds would primarily nest on beaches. Access restriction would include placement of barriers at the western edge of the beach in order to reduce nest disturbance. Placement of barriers would be done so as not to impact nesting. Chemical treatment and/or mechanical treatment of common reed could also be conducted in the area; care would be taken to complete activities away from nesting birds or when nesting is not occurring on the beach. Nesting surveys would be conducted before commencing restoration activities.
Seabirds (terns, gulls, skimmers, double-crested cormorant, American white pelican, brown pelican)	Foraging, feeding, resting, roosting,	Seabirds forage, feed, rest, and roost in the proposed alternative area. Some seabird species could utilize the beach habitat in the proposed alternative area for foraging, feeding, and resting. As such, they may be impacted locally and temporarily by the proposed alternative. It is expected that they would be able to move to another nearby location to continue foraging, feeding and resting. Chemical treatment and/or mechanical treatment of common reed could also be conducted in the area; care would be taken to complete activities away from nesting birds or when nesting is not occurring on the beach.
Raptors (osprey, hawks, eagles, owls)	Foraging, feeding, resting, roosting, nesting	Raptors forage, feed, rest and nest in the proposed alternative area. As such, they may be impacted locally and temporarily by the proposed alternative. It is expected that they would be able to move to another nearby location to continue foraging, feeding and resting. There is an existing Osprey nest in the northeastern part of the proposed alternative area. Work in the area could include debris removal. Debris removal would be completed so as not to disturb osprey nesting. Ospreys are relatively tolerant of human activity in the vicinity of their nests. Nesting surveys would be conducted before commencing restoration activities.
Goatsuckers	Foraging, feeding, resting, roosting, nesting	Goatsuckers forage, feed, rest, nest and roost in the proposed alternative area. However, they are nocturnal/crepuscular and therefore not active during

SPECIES	BEHAVIOR	SPECIES/HABITAT IMPACTS
		the project work period. They nest in thickets and woodlands. Nesting surveys would be conducted before commencing restoration activities.
Waterfowl (ducks, loons, and grebes)	Foraging, feeding, resting, roosting, nesting	Waterfowl forage, feed, rest, nest, and roost in the proposed alternative area. As such, they may be impacted locally and temporarily by the proposed alternative. It is expected that they would be able to move to another nearby location to continue foraging, feeding and resting. These birds primarily roost and nest in low vegetation. There would be no restoration activities in open water or estuarine marsh. Nesting surveys would be conducted before commencing restoration activities.
Doves and pigeons	Foraging, feeding, resting, roosting	Doves and pigeons could forage, feed, rest, and roost in the proposed alternative area. It is expected that they would be able to move to another nearby location to continue foraging, feeding and resting if disturbed by the project.
Rails and coots	Foraging, feeding, resting, roosting, nesting	Rails and coots forage, feed, rest, nest, and roost in the proposed alternative area. As such, they may be impacted locally and temporarily by the proposed alternative. It is expected that they would be able to move to another nearby location to continue foraging, feeding and resting if disturbed by the proposed alternative. These birds primarily roost and nest in marshes, which are within the action area. There would be no restoration activities where these species nest.

The Migratory Bird Treaty Act of 1918 (MBTA) implements various treaties and conventions among the United States, Canada, Japan, Mexico, and the former Soviet Union for the protection of migratory birds. Under MBTA, unless permitted by regulations, it is unlawful to pursue, hunt, take, capture, kill, attempt to take, capture, or kill, possess, offer for sale, sell, offer to barter, barter, offer to purchase, purchase, deliver for shipment, ship, export, import, cause to be shipped, exported, or imported, deliver for transportion, transport or cause to be transported, carry or cause to be carried, or received for shipment, transportation, carriage, or export, any migratory bird, part, nest, egg, or product, manufactured or not. USFWS regulations broadly define “take” under MBTA to mean “pursue, hunt, shoot, wound, kill, trap, capture, or collect, or attempt to pursue, hunt, shoot, wound, kill, trap, capture, or collect.”

The Bald and Golden Eagle Protection Act (BGEPA) of 1940 (16 U.S.C. 668-668c) prohibits anyone, without a permit issued by the Secretary of the Interior, from "taking" bald eagles, including their parts, nests, or eggs. BGEPA provides criminal penalties for persons who "take, possess, sell, purchase, barter, offer to sell, purchase or barter, transport, export or import, at any time or any manner, any bald eagle [or any golden eagle], alive or dead, or any part, nest, or egg thereof." Golden eagles are not present along the Gulf Coast.

The MMPA was enacted in response to increasing concerns among scientists and the public that significant declines in some species of marine mammals were caused by human activities. The MMPA established a national policy to prevent marine mammal species and population stocks from declining beyond the point where they ceased to be significant functioning elements of the ecosystems of which they are a part. DOC, through the NMFS, is charged with protecting whales, dolphins, porpoises, seals, and sea lions. Walrus, manatees, otters, and polar bears are protected by DOI through the USFWS. The MMPA established a moratorium on the taking of marine mammals in U.S. waters. It defines “take” to mean “to hunt, harass, capture, or kill” any marine mammal or attempt to do so. The MMPA further defines “harass” as any act of pursuit, torment, or annoyance that has the potential to disturb a marine mammal or marine mammals stock in the wild by causing disruption of natural behavioral patterns (Level B harassment).

Environmental Consequence for WCNH and Birds Proposed Alternative A (Preferred)
Migratory birds could use areas at and around the proposed alternative project area for foraging, feeding, resting, and nesting. Nesting species include raptors (forest edge near marsh), wading birds (pine trees/shrubs adjacent to estuarine marsh), marsh birds (estuarine marsh), waterfowl (estuarine marsh), and shorebirds (beach); table 3.3-10. For all planned restoration activities, pre-commencement nesting surveys for migratory birds and raptors within the restoration activity area would be conducted and if evidence of nesting is found, CP resource managers would coordinate with the USFWS to develop and implement appropriate conservation measures, such as those described below. Due to the implementation of best management practices no “take” of nesting birds is anticipated. There are no golden eagles in the proposed alternative footprint. Raptor nest surveys would be completed within the restoration activity area where raptor nesting habitat exists. If evidence of nesting is found, CP resource managers coordinate with the USFWS to develop and implement appropriate conservation measures, therefore no impacts to golden or bald eagles are anticipated. Potential adverse effects to birds include elevated noise levels due to the use of equipment for mechanical treatment, and from noise and smoke during prescribed fire. These species are mobile and would likely exit the area during management activities. Foraging and resting birds may temporarily be displaced during management activities. Bird roosting would not be affected because management activities would occur during daylight hours. Therefore, impacts are expected to be short-term, localized, and minor.

Best Practices
The MS TIG would consider best practices referenced in Section 6.15 and Appendix 6A of the PDARP/PEIS. Additional best practices may be recommended for site-specific restoration activities and management measures in different locations due to differences in relevant conditions. The following best practices derived from informal consultation with the USFWS (USFWS 2017a) would be implemented to the extent practicable in order to avoid and minimize impacts to migratory bird species including bald eagles:

Migratory Birds

Pre-work nesting surveys for migratory birds and raptors will be conducted and if evidence of nesting is found, resource managers will coordinate with USFWS Jackson, MS field office to develop appropriate conservation measures. These species are mobile and would likely exit the area during implementation of restoration measures and management activities (no impacts to overall population). The following best practices will be implemented to the extent practicable in order to avoid or minimize impacts to migratory bird species including bald eagles:

- Use care to avoid birds when operating machinery or vehicles near birds.
- Avoid working in migratory bird nesting habitats during breeding, nesting, and fledging (approximately mid-February through late August). If restoration measures or management activities must occur during this timeframe and breeding, nesting, or fledging birds are present, contact the state trust resource agency to obtain the most recent guidance to protect nesting birds or rookeries, and their recommendations will be implemented.
- Conservation areas may already be marked to protect bird nesting areas. Stay out of existing marked areas.
- If vegetation clearing is necessary, clear vegetation outside the migratory bird nesting season (approximately mid-February through late August) or have a qualified biologist inspect for active nests. If no active nests are found, vegetation may be removed. If active nests are found, vegetation may be removed after the nest successfully fledges.

Bald Eagles

- If bald eagle breeding or nesting behaviors are observed or a nest is discovered or known, have all activities avoid the nest by a minimum of 660 feet. If the nest is protected by a vegetated buffer where there is no line of sight to the nest, then the minimum avoidance distance is 330 feet. Maintain this avoidance distance from the onset of breeding/courtship behaviors until any eggs have hatched and eaglets have fledged (approximately 6 months).
- If a similar activity (such as driving on a roadway) is closer than 660 feet to a nest, maintain a distance buffer as close to the nest as the existing tolerated activity. If a vegetated buffer is present and there is no line of sight to the nest and a similar activity is closer than 330 feet to a nest, then maintain a distance buffer as close to the nest as the existing tolerated activity.
- In some instances, activities conducted within 660 feet of a nest may result in disturbance. If an activity appears to cause initial disturbance, stop the activity and move all individuals and equipment away until the eagles are no longer displaying disturbance behaviors.

The MS TIG has completed coordination and review of the proposed alternative for impacts to bald eagles and migratory birds in accordance with the BGEPA the MBTA and the MMPAto ensure appropriate conservation measures and best practices are incorporated into the project.

No Action Alternative

Under the No Action Alternative, the MS TIG would not implement any projects for the WCNH and Birds Restoration Types at this time, and would instead allow natural recovery processes to occur (outcomes described in Section 3.2). Natural recovery would take much longer compared to a scenario in which restoration actions were undertaken. Without NRDA funding for acquisition and preservation/management, these properties may be developed in the foreseeable future. Although migratory birds and bald/golden eagles would still be protected under the No Action Alternative, if these properties were developed, there would likely be impacts to habitats that these species use. It is likely that these impacts would be minimized with the use of required Best Management Practices. Noise disturbance would increase if development takes place. The No Action Alternative does not meet the MS TIG’s goals and objectives and does not provide the restoration benefit to WCNH and Birds that would occur through the proposed alternatives.

3.3.1.3.4 Wildlife

Affected Environment
Section 3.6 of the PDARP/PEIS discusses the biota of the northern Gulf of Mexico. For the proposed alternative project area, faunal species include those associated with natural estuarine marsh, transition areas and uplands adjacent to estuarine marsh, and beach habitats. These include various species of mammals, birds, fish, reptiles, infauna, epifauna, and other aquatic invertebrates. The mixing of freshwater from tributaries with saline water from the Mississippi Sound allows for a range of fish species in the waters of Graveline Bay/Bayou including redfish (*Sciaenops ocellatus*), freshwater catfish (*order Siluriformes*), flounder (*Paralichthys* spp.), speckled trout (*Cynoscion nebulosus*), white trout (*Cynoscion arenarius*), southern kingfish (*Menticirrhus americanus*), sheepshead (*Archosargus probatocephalus*), and black drum (*Pogonias cromis*), as well as crab and shrimp species. The estuarine emergent wetland habitat supports an array of neonate and juvenile fish and aquatic invertebrates. Other fish and marine mammals such as Atlantic bottlenose dolphins (*Tursiops truncatus*) could also occur in the Mississippi Sound adjacent to the proposed alternative area. The upland and freshwater areas support a range of species including, but not limited to, river otter (*Lontra canadensis*), white-tailed deer (*Odocoileus virginianus*), wild turkey (*Meleagris gallopavo*), squirrels (*Sciurus* spp.), and rabbit (*Sylvilagus aquaticus*). The MDMR plans for the CP within the proposed alternative project area include protecting habitats and the ecological integrity of the tidal marsh and adjacent uplands in order to benefit wildlife and habitat.

Environmental Consequences for WCNH and Birds Proposed Alternative A
Acquisition/Preservation: Prevention of development of habitats would be a long-term, benefit to wildlife species that currently inhabit or transiently utilize the preserved habitats.

<u>Access Restriction</u>: Access restriction would provide protection of shorebird habitat and would provide a long-term benefit to shorebirds, wading birds, pelicans, seagulls, and other species that routinely use the beach for loafing, foraging and nesting.

<u>Chemical Treatment</u>: Chemical treatment would result in a short-term, minor impact to wildlife species in and near treatment areas due to equipment noise and exposure to chemicals. There would be a long-term benefit to habitats and wildlife that utilizes the habitat.

<u>Mechanical Treatment and Prescribed Fire</u>: Mechanical treatment and prescribed fire would be the most intrusive to wildlife, however, these techniques would be applied to areas that have dense woody shrub layers which preclude utilization by several bird and mammal species. There would be a short term, minor to moderate impact to species in the area during mechanical treatment and prescribed fire. Many species would leave the area during the operations. Mechanically treated and/or prescribed fire areas would become open habitat and be colonized with native pine savanna species over several seasons. Once restored, these communities are one of the most diverse habitats and would result in increased diversity in insect, bird, and small mammal populations. There would be a long-term benefit to wildlife resulting from mechanical treatment and/or prescribed fire.

<u>Debris Removal</u>: Debris removal could result in short-term, minor impacts from equipment noise or disturbance during removal operations. There would be short-term benefits as a result of debris removal.

Road Removal/Repair and Culvert Placement: Road removal/repair and culvert placement would result in short-term, minor impacts to wildlife from equipment noise or disturbance during removal operations. Removing roadways would provide a long-term benefit by increasing habitat connectivity.

No Action Alternative
Under the No Action Alternative, the MS TIG would not implement any projects for the WCNH and Birds Restoration Types at this time, and would instead allow natural recovery processes to occur (outcomes described in Section 3.2). Natural recovery would take much longer compared to a scenario in which restoration actions were undertaken. Without NRDA funding for acquisition and preservation/management, these properties may be developed in the foreseeable future. If these properties were developed, there would likely be impacts to habitats that wildlife species use causing disturbances in all life stages of certain wildlife. Human disturbance such as noise would likely increase with development and could cause adverse impacts to wildlife. Wildlife habitat would not be enhanced under the No Action like it would in proposed Alternative A. The No Action Alternative does not meet the MS TIG's goals and objectives and does not provide the restoration benefit to WCNH and Birds that would occur through the proposed alternatives.

3.3.1.4 Socioeconomic Resources

Introduction to Affected Environment (Socioeconomic Resources): The section provides a discussion of socioeconomic resources and environmental justice, tourism and recreational use, cultural resources, land and marine management, and public health and safety. PDARP/PEIS Section 3.2 is incorporated by reference here.

Programmatic Review of Environmental Consequences (Socioeconomic Resources): Sections 6.4.1.5.3 and 6.4.10.1.3 of the PDARP/PEIS describe the impacts to Socioeconomic Resources for the relevant restoration approaches and are incorporated by reference and briefly described here.

PDARP/PEIS consequences related to economic effects: Acquisition and preservation could have long-term, minor to moderate adverse economic effects if acquisition prevents or limits development. Acquisition could permanently limit the amount and type of development permitted, and the management and intensity of use on these properties would likely change. Ownership changes and/or permitted uses could affect property taxes and have broader regional economic impacts. Land acquisition could have a minor to moderate impact on socioeconomic resources due to changes in visitor spending and tax impacts. The transfer of fee title to lands are transactions negotiated or arranged between willing parties and, as such, are not expected to give rise to adverse socioeconomic impacts to those who choose to engage in such transactions.

PDARP/PEIS consequences related to recreation and tourism: The acquisition of lands to protect habitat could result in impacts to recreation and tourism opportunities depending on site-specific land management practices applied. Closures, such as fencing or other mechanisms to protect nest sites, could result in short-term (seasonal) prohibitions on public access. Restrictions on public access in areas where public access had previously been allowed could reduce recreational opportunities. Over the long term, these techniques could result in healthy populations and provide wildlife enthusiasts with increased wildlife viewing opportunities. Conservation or acquisition of natural land resources can have indirect benefits on fish and wildlife habitat, potentially resulting in increased fishing and hunting opportunities. Seasonal or permanent employment could increase in order to provide labor for the installation, maintenance, and implementation of management projects such as hunting or trapping. Minor, short-term adverse impacts could result due to restoration activities. However, improvements in habitat associated with this approach may draw additional visitors to the area with associated visitor spending, increasing sales and tax receipts on retail purchases.

PDARP/PEIS consequences related to cultural resources: Creating, enhancing, or restoring bird nesting habitat may result in minor (temporary disturbance) to moderate (disturbance without loss of cultural information) impacts on cultural and historic resources depending on the scale of the action and site-specific characteristics. Discovery or recovery of cultural or historic resources would allow their future protection.

Table 3.3-10 summarizes the socioeconomic resources' environmental consequences associated with the proposed alternative which are discussed in detail in this section.

Table 3.3-10: Proposed Alternative Impacts to Socioeconomic Resources**.**

Socioeconomic Resources	Acquisition/Preservation	Access Restriction	Chemical Treatment	Mechanical Treatment	Prescribed fire	Debris Removal	Road Removal/Repair and Culvert Placement
Socioeconomic Resources and Environmental Justice							
Adverse Impact Duration	short to long-term	-	-	-	-	-	-
Adverse Impact Intensity	minor to moderate	-	-	-	-	-	-
Beneficial Impact Duration	-	-	-	-	-	-	-
Tourism and Recreational Use							
Adverse Impact Duration	-	-	short-term	short-term	short-term	-	-
Adverse Impact Intensity	-	-	minor	minor	minor	-	-
Beneficial Impact Duration	long-term	-	-	-	-	-	-
Cultural Resources							
Adverse Impact	TBD	TBD	TBD	TBD	TBD	TBD	TBD

Socioeconomic Resources	Acquisition/Preservation	Access Restriction	Chemical Treatment	Mechanical Treatment	Prescribed fire	Debris Removal	Road Removal/Repair and Culvert Placement
Duration							
Adverse Impact Intensity	TBD	TBD	TBD	TBD	TBD	TBD	TBD
Beneficial Impact Duration	TBD	TBD	TBD	TBD	TBD	TBD	TBD
Land and Marine Management							
Adverse Impact Duration	long-term	-	-	-	-	-	-
Adverse Impact Intensity	minor to moderate	-	-	-	-	-	-
Beneficial Impact Duration	-	-	-	-	-	-	-
Public Health and Safety, including flood and shoreline protection							
Adverse Impact Duration	-	-	short-term	-	short-term	-	-
Adverse Impact Intensity	-	-	minor	-	minor	-	-
Beneficial Impact Duration	long-term	-	-	-	-	-	-

As appropriate in a tiered analysis, the evaluation the proposed alternative focuses on the specific resources with a potential to be affected. Infrastructure, fisheries and aquaculture, marine transportation, aesthetics and visual resources would have negligible to minor adverse effects or would provide benefits. To avoid redundant or unnecessary information, a summary of environmental consequences for these resources is provided here.

Infrastructure: Infrastructure on the site includes access roads for logging/timber management, gas pipelines and utility corridors. There could be short-term, minor impacts to gas pipelines or utility corridors from activities associated with mechanical treatment and prescribed fire. Care would be taken to identify utility corridors as part of project planning and prior to implementation or restoration measures. Portions of poorly maintained roads within fire-suppressed pine savanna habitat would be removed as a result of implementing the proposed alternative. These are largely private logging roads.

The impacts resulting from these actions road repair/removal and culvert placement are covered in the site-specific analysis for physical and biological resources, but the proposed activities would not affect public infrastructure.

Fisheries and Aquaculture: There would be no activities in open water or estuarine marsh. Acquisition and restoration measures could benefit oyster reefs in Graveline Bay and Graveline Bayou by a net reduction in sediment movement resulting from preservation and restoration versus a development/build out scenario of lands proposed for acquisition.

Marine Transportation: There would be no restoration activity that would occur in open water; the proposed alternative would not have an impact on marine transportation.

Aesthetics and Visual Resources: Prescribed fire would result in a change in viewshed. There may be temporary short-term, minor impacts as a result due to presence of smoke. The land may look scorched after a prescribed fire until vegetation regrows. Depending on weather conditions, burn units can revegetate ("green up") within days to weeks. Revegetation after prescribed fire would result in a viewshed of natural vegetation with increased diversity of flowering plants and fauna. Removal of unmaintained roads and debris would enhance the aesthetic character of the land for the public that utilizes the area.

For socioeconomic and environmental justice, the following resources are further analyzed in this section:

- Socioeconomics and Environmental Justice
- Tourism and Recreational Use
- Cultural Resources
- Land and Marine Management
- Public Health and Safety

3.3.1.4.1 Socioeconomic Resources and Environmental Justice

Affected Environment
PDARP/PEIS Section 3.2 discusses socioeconomic resources of the Gulf Coast and is incorporated by reference here. The affected environment for the proposed alternative includes the population of Census Tract 409 and 411, specifically the residents close to the Graveline Bay. The population of Jackson County was 139,668 in 2010 and accounted for 4.7% of the state's total population, while Census Tract 409 (population 11,240 in 2010) accounted for 8% of the county population, and Census Tract 411 (population 6,700 in 2010) accounted for 5% of the county population (Table 3.3-12). In 2010, median household income in Jackson County was $49,145, which was 25% higher than the median household income in the State of Mississippi ($39,464). Median household income of Census Tract 409 in 2014 was $60,212, which is 23% higher than that of the county and 53% higher than the median household income of the state. Median household income of Census Tract 411 in 2014 was $41,985, which is 15% lower than that of the county and 6% higher than the median household income of the state (U.S. Census Bureau, 2010-2014 American Community Survey 5-Year Estimates).

Table 3.3-11: Population data (http://www.census.gov/2010census/popmap/).

Topic	Mississippi		Jackson County		Census Tract 409		Census Tract 411	
2010 Total Population	2,967,297		139,668		11,240		6,700	
White alone	1,754,684	59%	100,735	72%	9,163	82%	3,761	56%
Black or African American alone	1,098,385	37%	30,034	22%	1,321	12%	2,566	38%
Asian alone	25,742	<1%	3023	2.2%	251	2.2%	62	<1%
American Indian and Alaska Native alone	15,030	<1%	565	<1%	56	<1%	41	<1%
Native Hawaiian and Other Pacific Islander alone	1,187	<1%	79	<1%	11	<1%	3	<1%
Some Other Race alone	38,162	1.3%	2610	1.9%	155	1.3%	108	1.6%
Two or More Races	34,107	1.1%	2622	1.9%	283	2.5%	159	2.3%

Environmental Consequences for WCNH and Birds Proposed Alternative A (Preferred)
Acquisition and preservation of property in fee and an in-perpetuity set-aside would permanently restrict development on acquired parcels. The change in ownership would affect property taxes paid to local governments and could result in a broader regional economic impact resulting from changes in visitor spending in the area. There could be minor increases in spending resulting from recreational access to the proposed alternative project area as it increases in size and would also be expected to enhance opportunities to hike, or view wildlife in the area. Land acquisition could have a minor to moderate impact on socioeconomic resources due to changes in visitor spending and tax impacts. The transfer of fee title to lands would be transactions negotiated or arranged between willing parties and, as such, are not expected to give rise to adverse socioeconomic impacts to those who choose to engage in such transactions. Executive Order 12898 directs federal agencies to make achieving environmental justice part of its mission by identifying and addressing, as appropriate, disproportionately high adverse human health or environmental effects of its activities on minority and low-income populations. There would be no disproportionate impacts on minority, low-income, or underserved populations from the implementation of proposed Alternative A.

No Action Alternative
Under the No Action Alternative, the MS TIG would not implement any projects for the WCNH and Birds Restoration Types at this time, and would instead allow natural recovery processes to occur (outcomes described in Section 3.2). Natural recovery would take much longer compared to a scenario in which restoration actions were undertaken. Without NRDA funding for acquisition and preservation/management, these properties may be developed in the foreseeable future. If these properties were developed, there would likely be increased property taxes paid to local governments. There would be no benefits from additional recreational visitor spending that could result from

implementation of proposed Alternative A. The No Action Alternative does not meet the MS TIG's goals and objectives and does not provide the restoration benefit to WCNH and Birds that would occur through the proposed alternatives.

3.3.1.4.2 Tourism and Recreational Use

Affected Environment
The public has access to the Graveline Bay CP for recreational activities including boating, kayaking, fishing, bird-watching and pedestrian access, though hiking opportunities are limited. The Octavia Street boat ramp affords public access to CP properties as well as Graveline Bayou and its tributaries. Fishing, crabbing, and waterfowl hunting are also done in the area.

Environmental Consequences for WCNH and Birds Proposed Alternative A (Preferred)
Acquisition and preservation would result in a long-term benefit to tourism and recreational opportunities and would open an additional 1,410 acres, that were previously inaccessible, to recreational activities and would enhance the limited hiking opportunities that are currently available on the existing Graveline Bay CP. Implementation of the proposed alternative would also expand areas for fishing, bird-watching, and camping. There would be long-term benefits that would result from the implementation of proposed Alternative A. There could be a short-term, minor, adverse impacts to recreation to prevent public exposure to smoke during prescribed fire. There could be minor, short-term, adverse impacts to recreation due to restricted access during mechanical or chemical treatment operations. The public would be notified and access would be curtailed during short seasonal windows.

No Action Alternative
Under the No Action Alternative, the MS TIG would not implement any projects for the WCNH and Birds Restoration Types at this time, and would instead allow natural recovery processes to occur (outcomes described in Section 3.2). Natural recovery would take much longer compared to a scenario in which restoration actions were undertaken. Without NRDA funding for acquisition and preservation/management, these properties may be developed in the foreseeable future. The No Action Alternative would not increase tourism or recreation in the area that could be expected from proposed Alternative A. The No Action Alternative does not meet the MS TIG's goals and objectives and does not provide the restoration benefit to WCNH and Birds that would occur through the proposed alternatives.

3.3.1.4.3 Cultural Resources

Affected Environment
Cultural resources include historic properties listed in, or eligible for listing in the National Register of Historic Places (36 C.F.R. §60[a-d]). The National Historic Preservation Act of 1966 (NHPA), as amended and recodified (54 U.S.C. § 300308), defines an historic property as "any prehistoric or historic district, site, building, structure, or object included on, or eligible for inclusion on the National Register [of Historic Places]." Under the statute and implementing regulations, historic properties include significant traditional religious and cultural properties important to Indian tribes. Historic properties include built resources (bridges, buildings, piers, etc.), archaeological sites, and Traditional Cultural Properties, which are significant for their association with practices or beliefs of a living community that are both fundamental to that community's history and a piece of the

community's cultural identity. Although often associated with Native American traditions, such properties also may be important for their significance to ethnic groups or communities. Historic properties also include submerged resources.

This proposed alternative is currently being reviewed under Section 106 of the NHPA to identify any historic properties located within the proposed alternative area and to evaluate whether the proposed alternative would affect any historic properties. The MS TIG is currently conducting a literature review of the proposed alternative component areas. Previously recorded archaeological sites, shipwrecks, historical standing structures, National Register of Historic Places properties, National Register Districts and National Historic Landmarks are being reviewed. The preliminary review of the previously recorded archaeological sites using MDAH records revealed archaeological sites located within the vicinity of the proposed alternative component areas. The types of sites include shell middens and charted shipwrecks.

Environmental Consequences for WCNH and Birds Proposed Alternative A (Preferred)
The National Historic Preservation Act of 1966 (NHPA) charges the federal government with protecting the cultural heritage and resources of the nation. This proposed alternative would be implemented in accordance with all applicable laws and regulations concerning the protection of cultural and historic resources. Cultural and historic resources would be considered when preparing site-specific restoration measures and management actions. Where there is a likelihood disturbance of cultural resources, CP resource managers would conduct appropriate surveys to inform the methods and location of restoration and management actions. For site-specific restoration measures and management actions, environmental compliance would be conducted by evaluating each restoration measure/management action proposed to be conducted on the parcel(s) against the environmental threshold criteria evaluated under this programmatic analysis. Restoration measures/management actions would be designed to avoid cultural resources to the extent practicable. Graveline CP resource managers would work with the Mississippi State Historic Preservation Office and the DOI to determine compliance measures if resources are likely in the area or encountered during implementation.

No Action Alternative
Under the No Action Alternative, the MS TIG would not implement any projects for the WCNH and Birds Restoration Types at this time, and would instead allow natural recovery processes to occur (outcomes described in Section 3.2). Natural recovery would take much longer compared to a scenario in which restoration actions were undertaken. Without NRDA funding for acquisition and preservation/management, these properties may be developed in the foreseeable future. Cultural resources would still be protected under the No Action. Development of the area could result in the adverse impacts to cultural resources. The No Action Alternative does not meet the MS TIG's goals and objectives and does not provide the restoration benefit to WCNH and Birds that would occur through the proposed alternatives.

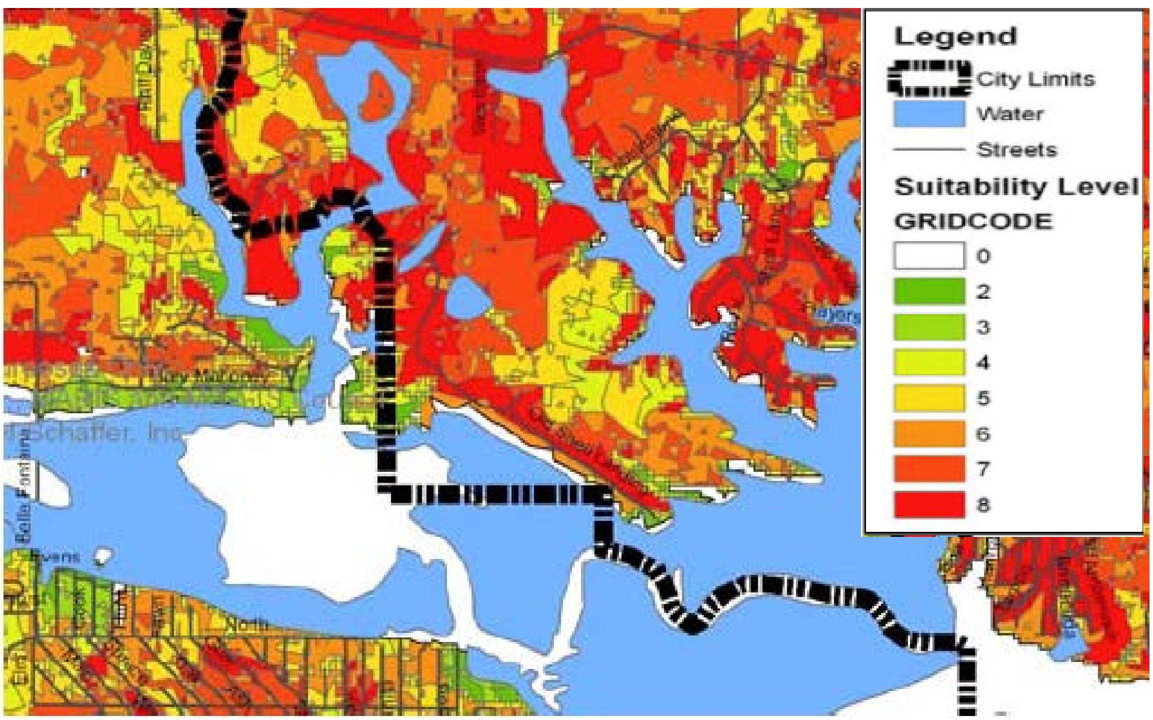
3.3.1.4.4 Land and Marine Management

Affected Environment
Land and marine management consideration for the Graveline Bay CP include Coastal Zone Management Act consideration, CP Planning initiatives and local land use planning. Governing the nature of land use development of the project component areas is the 1972 Coastal Zone Management

Act (CZMA), which provides for management of the nation's coastal resources and balances economic development with environmental conservation. The overall program objectives of CZMA remain balanced to "preserve, protect, develop, and where possible, to restore or enhance the resources of the nation's coastal zone." The water bottoms are considered state-owned and part of the Public Trust Tidelands.

The Graveline Bay Preserve is designated as a CP in the Mississippi CPs Program. It contains 2,339-acres and is bounded by Graveline Bay and Bayou. MDMR manages the area as a CP for conservation purposes to protect ecological integrity of tidal marsh and surrounding areas (MDMR 2015a).

According to the Future Land Use Map for Jackson County (Neel-Schaffer 2009) the future land use surrounding Graveline bay is General Agriculture to the east and northeast, Single Family Residential to the south, and Residential Estate to the west and northwest. A Land Development Suitability Model for the Graveline area developed by MDMR was utilized in the development of the Gautier Comprehensive Plan. It shows that most of the areas listed in this RP/EA as beach, estuarine marsh, open water, and most of the coastal plains small stream forest, as being "Water" which is not suitable for development. Most of the beech-magnolia forest and fire suppressed pine savanna are Levels 6, 7, and 8, with 8 being the most suitable for development.



Source: Mississippi Department of Marine Resources

Figure 3.3-3: MDMR Land Development Suitability Model.

The City of Oceans Springs is to the west of the alternative project area and the City of Gautier is to the east. The 2010 Ocean Springs Comprehensive Plan shows Graveline Bay and Bayou and areas to the south, west, and northeast as Southeast Growth Area. These are areas which might be appropriate for annexation. The Comprehensive plan describes this growth area as:

…much of the Southeast Growth Area contains wetlands, and the area was flooded extensively during Hurricane Katrina. However, as the eastward expansion of population from Ocean Springs continues, especially as families seek more affordable housing (Planning Works, 2010).

The Ocean Springs School District recently constructed a $37.0 M High School near Graveline Bayou. It opened in 2012 and was named the third best school in the state in 2016. The district is widely recognized as one of the highest quality school districts on the Gulf Coast and it is an attractor for residential development and economic development in the Ocean Springs. The new high school is expected to increase development in the area (Planning Works, 2010). The only planned acquisition in the Ocean Springs City limits is to the south of Graveline Bay (Graveline beach). To the north of Graveline Bay and in the City of Ocean Springs, the planned acquisitions are primarily fire-suppressed pine flatwoods.

Environmental Consequences for WCNH and Birds Proposed Alternative A (Preferred)
The acquisition and management of up to 1,410 acres of land in the City of Ocean Springs and City of Gautier new growth areas could require zoning change or variance to designate areas as conservation lands. Acquisition and restoration would affect planned land use by removing the land from residential development. The proposed action is consistent with CP planning initiatives. There would be a long-term, minor to moderate, adverse effect to land and marine management depending on the number of willing sellers and the size of parcels acquired and preserved.

No Action Alternative
Under the No Action Alternative, the MS TIG would not implement any projects for the WCNH and Birds Restoration Types at this time, and would instead allow natural recovery processes to occur (outcomes described in Section 3.2). Natural recovery would take much longer compared to a scenario in which restoration actions were undertaken. Without NRDA funding for acquisition and preservation/management, these properties may be developed in the foreseeable future; however, development would likely have no effect on land and marine management, as existing developments would be completed and would be consistent with existing land use plans. The No Action Alternative does not meet the MS TIG's goals and objectives and does not provide the restoration benefit to WCNH and Birds that would occur through the proposed alternatives.

3.3.1.4.5 Public Health and Safety

Affected Environment
The proposed alternative area consists of Graveline Bay, Graveline Bayou, and surrounding uplands. The surrounding communities that use the area for recreation make up the public health and safety affected resource.

Most of the proposed alternative area is a floodplain. A large portion of the area is mapped as Zone VE. This includes beach areas, open water and mostly estuarine marsh. Zone VE is defined as Coastal flood zone with velocity hazard. Some estuarine marsh, streams, and riparian areas are mapped as Zone AE. Zone AE is defined as "Base Flood Elevations Determined". Upland areas are mostly Zone X. Zone X are defined as " Areas of 0.2% annual change flood; areas of 1% annual chance flood with average depths of less than 1 foot or with drainage areas less than 1 square mile; and areas protected by levees from 1% annual chance flood". Proposed alternative activities would not result in a detectable change to natural and beneficial floodplain values. Restored hydrology from road removal/repair and culvert placement would enhance floodplain functions. The floodplain in acquired and managed parcels would be maintained for flood storage capacity and would preclude residential development and flood risk. Prescribed fire and chemical treatment would also expose the public to smoke and potentially chemicals, respectively.

Environmental Consequences for WCNH and Birds Proposed Alternative A (Preferred)
There would be a short-term, minor adverse impacts to public health and safety. Exposure to smoke during prescribed fires would adversely impact public health, but these impacts are expected to be minor since prescribed fires are typical in this region and short term. Prescribed fire plans that include public notification of fires and controlled access into the site during prescribed fires would be developed to minimize the risk and potential exposure of the public to smoke. Fire breaks would restrict fire to designated areas and crews would be on site to ensure that fire does not jump the fire breaks. Safety plans would be part of the prescribed fire plans.

Chemical treatment would require use of herbicide that could be hazardous if spilled or handled improperly. Personnel applying chemicals would follow all warning labels on chemical containers and proper permits would be secured prior to treatment activities. Most of the applications would be in remote areas where there is limited public access.

The proposed alternative area is designated as floodplain. Preventing development in the floodplain/the transition of native habitats to new impervious surface provides a flood risk/public safety benefit. The proposed alternative would have a beneficial effect to the surrounding communities. It would promote healthy lifestyles by allowing recreational use on previously private parcels of land.

No Action Alternative
Under the No Action Alternative, the MS TIG would not implement any projects for the WCNH and Birds Restoration Types at this time, and would instead allow natural recovery processes to occur (outcomes described in Section 3.2). Natural recovery would take much longer compared to a scenario in which restoration actions were undertaken. Without NRDA funding for acquisition and preservation/management, these properties may be developed in the foreseeable future. If these properties were developed, there would likely be no impacts to public health and safety since local building codes and ordinances would be followed. The No Action Alternative does not meet the MS TIG's goals and objectives and does not provide the restoration benefit to WCNH and Birds that would occur through the proposed alternatives.

3.3.2 Site-Specific NEPA Review for WCNH and Birds Proposed Alternative A (Preferred)

Section 3.3.1 is a discussion of environmental consequences analysis for proposed Alternative A for WCNH and Birds Restoration Types at a programmatic level. The exact parcels and associated restoration measures and management activities on those parcels are not known at this time. The environmental consequences are based on the range of restoration measures and management activities contemplated on parcels in the proposed alternative project area. The programmatic analysis provides maximum adverse impacts to each of the resource categories based on the MS TIG's knowledge of the proposed alternative project area and the restoration activities and management measures likely needed to restore the project area. The MS TIG is proposing the selection of

Alternative A (Preferred). Section 3.1.2 also presents a process that the MS TIG would follow to complete the requirements of NEPA and other environmental statutes as site-specific restoration measures and management activities are planned for Alternative A, if selected.

3.4 Grand Bay Land Acquisition and Habitat Management-Background and Project Description

The proposed Grand Bay Land Acquisition and Habitat Management project includes acquiring privately owned inholdings within the boundaries of the Grand Bay National Wildlife Refuge (NWR), Grand Bay National Estuarine Research Reserve (NERR), and the Grand Bay Savanna CP (Figure 3.4-1). Public and private lands within these boundaries total 28,262 acres. The USFWS manages the NWR,[38] and MDMR manages lands on the NERR[39] and the CP.[40] The project location consists of parcels adjacent to and near Grand Bay in Jackson County, Mississippi. The project is located in Jackson County, Mississippi in the boundaries of Grand Bay NWR, NERR and Grand Bay Savanna CP (Figure 3.4-1). The proposed project alternatives consider a number of measures:

- Alternative B - acquisition of up to 8,000 acres of land from willing sellers at appraised value in the NWR, NERR and CP boundaries
- Alternative C - habitat management on up to 17,500 acres of current public lands within the NWR, NERR and CP boundaries
- Alternative D - a combination of both acquisition (up to 8,000 acres) and habitat management (up to 17,500 acres) on both current public lands and acquired parcels in the NWR, NERR and CP boundaries

The proposed Grand Bay Land Acquisition and Habitat Management project has several objectives including: acquisition of properties to protect habitat; contiguous ownership of large tracts for connectivity and to facilitate large-scale, well-established habitat management techniques; and restoration of the structure and function of target habitats within the project boundary (Figure 3.4-1; Table 3.4-1). These actions help restore injuries to wetlands, coastal, and nearshore habitats in Mississippi as well as bird species injured by the *DWH* Oil Spill.

Habitat that could be acquired includes a diverse array of nearshore coastal and wetland habitats. Grand Bay coastal wetland and nearshore habitats include coastal marsh, beach, freshwater marsh, pine savannas and flatwoods, forested freshwater scrub-shrub, and open water including tidal creeks and bayous (Figure 3.4-1; Table 3.4-1). Habitat in the project area is utilized for foraging, nesting

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[38] Land Protection Plan and Final Environmental Assessment for the Expansion of Grand Bay National Wildlife Refuge (USFWS 2012) and Grand Bay National Wildlife Refuge Comprehensive Conservation Plan (USFWS 2008)
[39] Grand Bay National Estuarine Research Reserve Final Environmental Impact Statement/Reserve Management Plan (MDMR 1998)
[40] Mississippi Gulf Ecological Management Sites (MDMR 2016)

and/or loafing by bird species that were injured in the *DWH* Oil Spill. Restoration measures and management activities conducted under this project would provide benefits to wading bird species injured by the *DWH* Oil Spill.

A total of 448 acres of developed land is also present within the proposed project area. Residential and commercial development has been proceeding rapidly in the coastal portion of Jackson County, Mississippi, converting forest plantations and farm fields into developed lots with houses, businesses, and institutions (USFWS, 2008). Publicly-owned developed land within the project area consists of 390 acres, comprised of roads, the I-10 rest area, I-10 weigh station, and Grand Bay NERR visitor center. Privately-owned developed land within the proposed project area consists of 58 acres comprised mostly of single family residences, associated outbuildings, agricultural buildings and a commercial development.

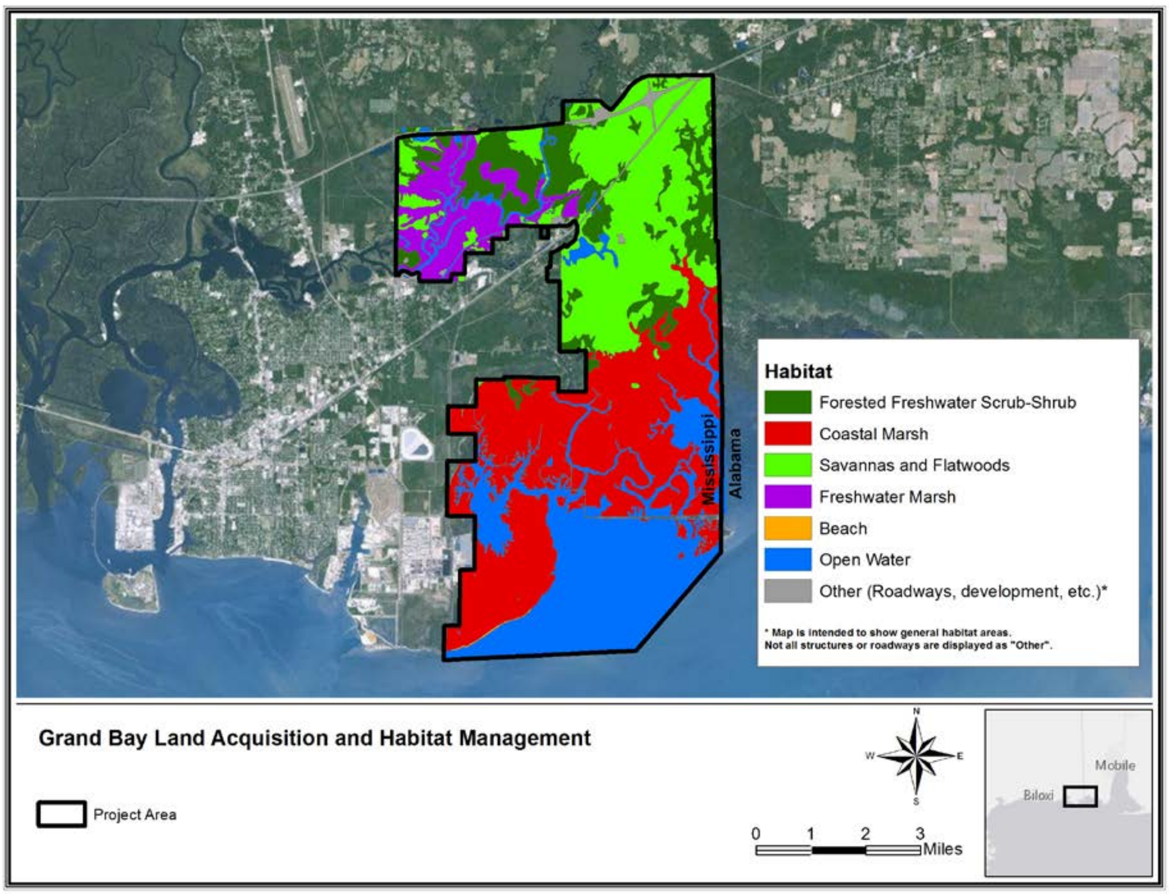

Figure 3.4-1: Habitats in the Grand Bay Land Acquisition and Habitat Management Project Area.

Table 3.4-1: Grand Bay Land Acquisition - Habitats[41] and Ownership Within the Proposed Project Area.

Habitat	Publicly Owned (acres)	Privately Owned (acres)	Total Acreage of Habitat
Forested Freshwater Scrub-Shrub	1,895	1,416	3,311
Coastal Marsh	7,003	2,077	9,080
Savannas and Flatwoods	2,741	3,535	6,276
Freshwater Marsh	730	1,207	1,937
Beach	21	0	21
Open Water	6,443	746	7,189
Other (Roadways, development, etc.)	390	58	448
Total	19,223	9,039	28,262

Section 5.5.2.2 of the PDARP/PEIS describes seven restoration approaches for the WCNH Restoration Type. Section 5.5.12.2 describes eight restoration approaches for the Birds Restoration Type. The restoration approaches proposed by the MS TIG that address the goals and objectives for this project include:

- Protect and conserve marine, coastal, estuarine and riparian habitats; and
- Restore and conserve bird nesting and foraging habitat.

Restoration measures and benefits would include acquisition to reduce the threat of further development and to provide for large-scale management efforts, habitat enhancement, decreased habitat fragmentation and increased habitat connectivity to other large conservation parcels in the area. Appropriate management practices for the landscape, such as large-scale fire management, is less effective in landscapes where publicly and privately owned parcels are interspersed since management cannot continue from public to private properties without management agreements.

The MS TIG is proposing to allocate $6.0 M toward this project.[42] MDEQ and DOI would be Implementing Trustees for the project. DOI will also be the lead federal agency for conducting the environmental evaluation review for implementation. MDMR would be a project partner.

Restoration Measures-Methodology and Timing

The proposed alternatives include management of habitats within the project boundary that are currently in public ownership and in newly acquired parcels (See Figure 3.4-1). The Implementing Trustee would begin negotiations with willing sellers (e.g., title surveys, appraisals, etc.) after RP/EA approval. Additional data collection on target habitats needed to facilitate restoration and

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[41] Habitat acreage was calculated from available resource map and Trustee experience in the project area.

[42] The project budget of $6.0 M would not complete the acquisition of the entire 8,000 acres and/or the 17,500 acres of management. There are other *DWH* funded projects which propose acquisition and habitat management in the Grand Bay proposed project alternative area and there could be additional *DWH* funds for these activities in Grand Bay in the future.

management (e.g., habitat inventories, identification of appropriate restoration measures and management activities, etc.) would also be conducted following approval of the project. Restoration measures and management activities would be implemented on a site-specific basis and may vary across the project area depending on the current condition of habitats. Habitat restoration measures and management activities could include chemical treatment, mechanical treatment, and prescribed fire, described below. Proposed restoration measures and management activities by habitat type are summarized in Table 3.4-2.

Table 3.4-2: Restoration Measures and Management Activities by Habitat.

Habitat	Total Publicly owned	Total Privately Owned Parcels	Total Acres of Habitat	Acquisition/Preservation	Chemical Treatment	Mechanical Treatment	Prescribed Fire
Developed	390	58	448				
Forested Freshwater Scrub-Shrub	1,895	1,416	3,311	x	x	x	
Coastal Marsh	7,003	2,077	9,080	x	x	x	
Savannas and Flatwoods	2,741	3,535	6,276	x	x	x	x
Freshwater Marsh	730	1,207	1,937	x	x	x	
Beach	21	0	21	x			
Water	6,443	746	7,189				

Acquisition and Preservation: Protection of habitats is consistent with the MS TIG goal to increase connectivity of coastal habitats. Lands would be purchased in fee from willing sellers at appraised value. Acquisition and preservation includes the purchase of land and preservation in perpetuity, facilitating protection of habitats on the parcels through prevention of development. Acquisition and preservation would apply to up to 8,000 acres of various habitats including forested freshwater scrub-shrub, coastal marsh, pine savannas and flatwoods, freshwater marsh and beach as listed in Table 3.4-2. Acquired properties would then be held in trust and managed in perpetuity. The proposed project time frame is limited to 15 years. Acquisition and preservation would apply to Alternative B and Alternative D (Preferred).

Invasive species Management: Invasive species management will focus on prevention, control and eradication of known exotic invasive plant species in the project area for the proposed alternatives. Example species include, but are not limited to, Chinese privet (*Ligustrum sinense*), Chinese tallow (*Sapium sebiferum*), common reed (*Phragmites australis*), Cogon grass (*Imperata cylindrica*), Japanese climbing fern (*Lygodium japonicum*), Japanese honeysuckle (*Lonicera japonica*) and others. A number of techniques are commonly utilized on the NWR and NERR and at the nearby Sandhill Crane NWR to accomplish this, incorporated by reference here (USFWS 2007, USFWS 2008, GBNERR 2016). For example, prescribed fire is used for both reduction of fuel loads and invasive species management in savannas to promote grassy-herbaceous ground cover. For the purposes of discussion and to facilitate a programmatic impact analysis, invasive species management techniques will be divided into three categories described below: 1) Chemical Treatment, 2) Mechanical Treatment, and Prescribed Fire would also be utilized as a restoration measure and management activity. Resource managers could use an integrated approach including a variety of techniques for site specific restoration and management measures depending on existing habitat conditions.

1) **Chemical Treatment**: Chemical treatments could include basal-bark application, cut stump treatments, foliar spray applications, or stem injection of herbicides to target eradication or control of invasive plant species. These applications are typically completed seasonally in target areas. Activities could require the vehicular transport of personnel into areas, use of approved herbicides, use of established safety and containment procedures, and the targeted application of herbicide in small areas. Personnel applying chemicals would follow all warning labels on chemical containers and proper permits would be secured prior to treatment activities. Treatments are typically done in areas that range from several acres up to 50 acres for a large-scale treatment by trained personnel. Within the proposed project area, chemical treatment would be limited to small areas within 3,311 acres of forested freshwater scrub shrub habitat, 9,080 acres of coastal marsh, 6,276 acres of pine savannas and flatwoods, and 1,937 acres of freshwater marsh. Chemical treatment would be applicable to Alternative C and Alternative D (Preferred).

2) **Mechanical Treatment**: Mechanical treatment is often used in combination with prescribed fire to reduce woody vegetation and trees in target habitats. Use of these techniques result in an increase in savanna species including sun-loving graminoids (grass-like plants) and forbs (flowering plants) (desired conditions in this area). Mechanical treatment could include removal of trees using commercial tree contracts, chain saws, bulldozing, use of a bulldozer or gyro trac with roller chopper to remove shrubs and small trees or drum chopping to push over and crush small, pre-commercial pines and shrubs. In wet areas, soft track or wide track equipment would be used to distribute the equipment weight and minimize ground disturbance. Alternatively, crews may remove material with chainsaws or by hand. Replanting could also be part of habitat restoration and management operations. Mechanical treatment is used both at small and large scales successfully: several thousand acres of undesirable vegetation has been cleared in the Sandhill Crane NWR (USFWS 2007). Mowing, tilling and disking are also used to prevent the spread of invasive species such as cogon grass. Mechanical treatment would be used within 3,311 acres of forested freshwater scrub shrub habitat, 9,080 acres of coastal marsh, 6,276 acres of pine savannas and flatwoods, and 1,937 acres of freshwater marsh within the project area. Operations could occur over several seasons depending on the success of acquisitions and other restoration priorities. Mechanical treatment would be applicable to Alternative C and Alternative D (Preferred).

Prescribed Fire: Native habitats within the southeastern United States, including those within the project boundary, evolved in the midst of reoccurring, natural fires (USFWS 2007, USFWS 2008, GBNERR 2016). These habitats therefore depend on a reoccurring fire schedule. Habitat management agencies in the project area therefore successfully use prescribed fires to restore and maintain high quality, natural habitats. Prescribed fires reduce woody vegetation and tree encroachment in pine savanna habitat and can be effective in helping prevent the spread of certain exotic invasive species (e.g., Cogon grass and Chinese tallow), when used in combination with other methods (e.g., chemical and mechanical treatment). This project proposes to implement a schedule of prescribed fires on publicly owned property within the project boundary to accomplish habitat restoration and management goals. Wire grass, for example, is a fire-dependent savanna species. Only after being burned during the growing season will this grass produce seeds. Their complex system of underground roots and shoots helps them survive the fire. By increasing species such as this, the project is also expected to provide services to wildlife that use them, such as many declining populations of grassland bird species that rely on savanna habitat.[43] Historically, natural fire occurred on a three to five-year interval. Fires were of low intensity, fueled by grasses and pine litter. Prescribed fire and associated management within the project boundary would simulate these historic, natural fires.

Site preparation for a prescribed fire often involves compression of vegetation using equipment like roller choppers, gyro tracs, and excavators and/or other mechanical treatments included above to create habitat conditions which facilitate desired fires. Clearing, plowing and disking may be used to prepare fire breaks, zones devoid of fuel that border burn units and help manage fire boundaries. Fire could be applied using handheld drip torches to initiate prescribed fire. Aerial ignition from helicopters could also be used. Prescribed fires would follow standardized planning protocols and methodologies, such as considering environmental factors (certain weather, fuel and moisture conditions that would make the fire manageable[44]) and burning on a 2-3 year rotation during the growing season (spring and summer months, when possible). Prescribed fires could range in size depending on habitats and logistics; average prescribed fires at Grand Bay NWR are 79 acres, compared to 59 acres at Mississippi Sandhill Crane NWR. Twenty percent of the Grand Bay fires reach 100 acres or more, compared to 13% at the Mississippi Sandhill Crane NWR (USFWS 2005). For Alternatives C and D prescribe fire would applied on up to 6,276 acres of savanna and flatwoods.

Best Practices: The MS TIG would consider best practices referenced in Section 6.15 and Appendix 6.A of the PDARP/PEIS to avoid and minimize impacts to resources. Best practices listed in the PDARP/PEIS are intended to evolve as an adaptive management component of implementing the PDARP/PEIS; as such, the appendix to the PDARP/PEIS is a living document. As new best practices are established, existing best practices are refined, or new techniques and information are informed by implementation, these measures will be added to or updated in the relevant web sites identified in the appendix of the PDARP/PEIS. In this capacity, new projects will have available the current range of best practices to support project design and implementation. In addition to PDARP/PEIS best practices, the MS TIG could develop best practices for site-specific restoration measures and management activities in different locations due to differences in relevant site conditions.

[43] https://www.fws.gov/refuge/Grand_Bay/what_we_do/resource_management.html
[44] https://www.fws.gov/mississippisandhillcrane/fire.html

3.4.1 Grand Bay Land Acquisition and Habitat Management Alternatives B-D: Affected Environment and Environmental Consequences

This section discusses proposed Grand Bay Land Acquisition and Habitat Management Alternatives B, C and D (listed below). Proposed Alternative D is one of two preferred alternatives for WCNH and Birds. The other alternative, Proposed Alternative A (Preferred): Graveline Land Acquisition and Management was discussed above in Section 3.3.

- Alternative B: Grand Bay Land Acquisition (Up to 8,000 acres)
- Alternative C: Grand Bay Habitat Management (Up to 17,500 acres)
- Alternative D (Preferred): Grand Bay Land Acquisition and Habitat Management (Alt. B + C)

Alternative B: Grand Bay Land Acquisition (Up to 8,000 acres)
The proposed action for Alternative B would include the acquisition of privately owned land from willing sellers of up to 8,000 acres of habitat within the boundaries of the Grand Bay NWR, Grand Bay NERR and Grand Bay Savanna CP (Figure 3.4-1). Habitat management activities described in Section 3.4 would not be implemented on newly acquired lands. Habitat management activities as currently planned and implemented under existing management plans and policies would continue on publicly owned lands.

Alternative C: Grand Bay Habitat Management (Up to 17,500 acres)
The proposed action for Alternative C would include habitat management of 17,500 acres of publicly owned lands within the boundaries of the Grand Bay NWR, Grand Bay NERR and Grand Bay Savanna CP (Figure 3.4-1). Privately owned lands within the NWR, NERR and the CP boundaries would not be acquired. Habitat management activities described in Section 3.4 above would be implemented to enhance habitat only on the existing publicly owned lands.

Alternative D (Preferred): Grand Bay Land Acquisition (up to 8,000 acres) and Habitat Management (up to 17,500 acres)
The proposed action for Alternative D (Preferred) would include acquisition of up to 8,000 acres of land and habitat management of up to 17,500 acres of currently owned and newly acquired lands within the boundaries of the Grand Bay NWR, Grand Bay NERR and the Grand Bay Savanna CP (Figure 3.4-1).

Project Location
The project location consists of parcels adjacent to and near Grand Bay in Jackson County, Mississippi. The project is located in Jackson County, Mississippi in the boundaries of Grand Bay NWR, NERR and Grand Bay Savanna CP (Figure 3.4-1).

3.4.1.1 Overview of Affected Environment and Environmental Consequences

This analysis incorporates by reference the relevant portions of Section 3.5.1 (Nearshore Ecosystem) of the PDARP/PEIS. The PDARP/PEIS provides programmatic evaluation of the environmental consequences of the restoration approaches “Protect and conserve marine, coastal, estuarine and riparian habitats" and "Restore and conserve bird nesting and foraging habitat", which are considered in this RP/EA. PDARP/PEIS evaluations from Sections 6.4.1.5 and 6.4.10.1 are incorporated by reference here. Tiering from that analysis, this section presents the Affected Environment of Grand Bay and environmental consequences of the proposed actions in context of the project-specific affected environment.

The programmatic analysis looked at a series of resources as part of the biological, physical, and socioeconomic environment. As appropriate in a tiered analysis, the evaluation of each alternative focuses on the specific resources with a potential to be affected by the proposed project. To avoid redundant or unnecessary information, resources that are not expected to be affected are evaluated summarily in the respective sections. These resources include, noise, marine and estuarine fauna, infrastructure, fisheries and aquaculture, marine transportation, and aesthetics and visual resources which will be discussed in Sections 3.4.1.2, 3.4.1.3 and 3.4.1.4.

3.4.1.2 Physical Environment

Introduction to Affected Environment (Physical Environment): Geology and Substrates, Hydrology and Water Quality, and Air Quality and Greenhouse Gas Emissions are discussed in this section. PDARP/PEIS Sections 3.3.1, 3.3.2, 3.3.3 and 3.5.1 are incorporated by reference here. The affected environment for the proposed alternative physical environment is described in respective sections below.

Programmatic Review of Environmental Consequences (Physical Environment): Sections 6.4.1.5.1 and 6.4.10.1.1 of the PDARP/PEIS describe the impacts to Physical Resources for the relevant restoration approaches and are incorporated by reference and briefly described here.

PDARP/PEIS consequences related to geology and substrates, water resources, and air quality: Specific restoration activities identified as part of land management plans could result in short-term, minor to moderate adverse effects on geology, substrates, and water resources. Fire management may have short-term adverse impacts on soils, substrates, and air quality. Land acquisition could permit public access for recreational use which could result in short-term, minor to moderate adverse effects through increased soil compaction, rutting, or erosion caused by human presence and activity within the conservation area. Increased public use could result in short-term, minor effects on surface water through increased sedimentation. Fee title land acquisition could reduce disturbance of geology and substrates by protecting lands from development pressure. This would be a long-term beneficial effect that will extend the life of the project.

PDARP/PEIS consequences related to hydrology and water quality: Where protected lands overlap ground water recharge zones, surface water, or brackish-water resources, water sources and water quality could be further protected from future degradation by helping to reduce runoff. Similarly, where protected land overlaps wetlands or shorelines, the protection of natural hydrologic processes could indirectly help limit development and associated effects on water quality, including by way of saltwater intrusion. These would be long-term beneficial effects.

Environmental consequences for the proposed alternatives are within the general range impacts as described in the PDARP/PEIS with some variances related to specific actions. As appropriate in a tiered analysis, the evaluation of the proposed alternative focuses on the specific resources with a potential to be affected. Noise impacts for the proposed alternative would be negligible to minor. To avoid redundant or unnecessary information, noise is evaluated here.

Noise: Restoration measures and management activities that would have adverse noise impacts would occur primarily in savannas and flatwoods (mechanical treatment associated with prescribed fire). There would be short-term, minor, adverse noise impacts from equipment and operations associated with mechanical treatment, establishment of fire breaks, prescribed fire operations, and road repair/removal and culvert placement. Restoration activities would occur sporadically and seasonally and would be dependent on successful acquisitions. The operations would be short-term and are remote. Noise receptors in the area of the work would be buffered by forested areas between the receptor and the site of noise-producing activity. Acquisition and preservation of developable areas would provide a long-term benefit by reducing ambient noise pollution when compared to a build out scenario if property were developed. In addition, the following best practice would be implemented for the proposed alternative to the extent practicable: Minimize construction noise to the maximum extent practicable when working near protected species and their habitats.

For the physical environment, the following resources are further analyzed below:

- Geology and substrates;
- Water Quality and Hydrology; and
- Air Quality and Greenhouse Gas Emissions.

3.4.1.2.1. Geology and Substrates

Affected Environment

Section 3.3.3 of the PDARP/PEIS discusses the geomorphological zones of the northern Gulf of Mexico. The Grand Bay Land Acquisition and Habitat Management project area for proposed alternatives is located within the Gulf Coastal Plain and the Mississippi Alluvial Plain physiographic regions. Landforms and substrates are generally comprised of Holocene sediments. These sediments are composed of sand, silt, and clay with comparatively high organic matter content. The coastal estuaries of Mississippi are composed of mostly sandy fine-grained sediment, silt and clays (Schmid 2015).

Seismic activity in the project area for proposed alternatives is low. Since the late 1800s, about ten earthquakes large enough to be detected have occurred in the Gulf of Mexico. These earthquakes were mostly small-magnitude events (magnitudes of 3 to 4 on the Richter scale).

Data from the Mississippi State Geological Survey generally indicates that surface soils in the project area for the proposed alternatives consist of Holocene age coastal deposits of loam, sand, gravel, and clay. The United States Department of Agriculture (USDA) Natural Resource Conservation Service (NRCS) Web Soil Survey identifies 32 soil-mapping units within the footprint of the proposed project. These soil map units located within the project footprint area are listed on Table 3.4-3 (NRCS 2016). Of these soils Atmore loam, 1 to 3 percent slopes; Axis mucky sandy clay loam, frequently flooded; Bayou sandy loam, 0 to 1 percent slopes; Croatan and Johnston soils, frequently flooded; Daleville loam, ponded; Daleville silt loam, 0 to 1 percent slopes; Handsboro mucky silt loam, frequently flooded; Harleston fine sandy loam, 0 to 2 percent slopes; Hyde silt loam; Johns loamy fine sand, 0 to 2 percent slopes; Kinston, Chastain, and Mantachie soils, frequently flooded; Myatt loam, 0 to 1 percent slopes, occasionally flooded; Nugent and Jena soils, frequently flooded; Ocilla loamy sand, 0 to 2 percent, occasionally flooded; Smithton loam, 0 to 1 percent slopes, occasionally flooded; and Stough loam, 0 to 2 percent slopes are listed as hydric (NRCS 2016a). Soils characteristics are listed in Table 3.4-3.

Table 3.4-3: Soils Characteristics in the Project Area for WCNH and Birds Alternatives B, C and D.

Soil Type	Texture	Drainage Class
Kinston, Chastain, and Mantachie soils, frequently Flooded	Fine Sandy Loam (upper) Sandy Clay Loam (lower)	Poorly Drained
Atmore loam, 1 to 3 percent Slopes	Loam (upper) Loam (lower)	Poorly Drained
Lenoir silt loam, 0 to 1 percent Slopes	Silt Loam (upper) Clay (lower)	Somewhat Poorly Drained
Daleville silt loam, 0 to 1 percent Slopes	Silt Loam (upper) Clay Loam (lower)	Poorly Drained
Daleville loam, ponded	Loam (upper) Clay Loam (lower)	Poorly Drained
Eustis loamy sand, 0 to 5 percent slopes	Loamy Sand (upper) Loamy Sand (lower)	Somewhat Excessively Drained
Eustis loamy sand, 5 to 12 percent slopes	Loamy Sand (upper) Loamy Sand (lower)	Somewhat Excessively Drained
Bigbee loamy sand, 0 to 5 percent slopes, occasionally flooded	Loamy Sand (upper) Fine Sand (lower)	Somewhat Excessively Drained
Myatt loam, 0 to 1 percent slopes, occasionally flooded	Loam (upper) Sandy Clay Loam (lower)	Poorly Drained
Hyde silt loam	Silt Loam (upper) Silt Clay Loam (lower)	Very Poorly Drained
Smithton loam, 0 to 1 percent slopes, occasionally flooded	Loam (upper) Sandy Loam (lower)	Poorly Drained
Johns loamy fine sand, 0 to 2 percent slopes	Loamy Fine Sand (upper) Sandy Clay Loam (lower)	Somewhat Poorly Drained
Vancleave loamy sand, 0 to 2 percent slopes	Loamy Sand (upper) Sandy Loam (lower)	Moderately Well Drained
Vancleave loamy sand, 2 to 5 percent slopes	Loamy Sand (upper) Sandy Loam (lower)	Moderately Well Drained
Escambia very fine sandy loam, 0 to 2 percent slopes	Very Fine Sandy Loam (upper) Loam (lower)	Somewhat Poorly Drained
Malbis fine sandy loam, 0 to 2 percent slopes	Fine Sandy Loam (upper) Loam (lower)	Well Drained
Ocilla loamy sand, 0 to 2 percent slopes, occasionally flooded	Loamy Sand (upper) Loamy Sand (lower)	Somewhat Poorly Drained
Benndale fine sandy loam, 3 to 8 percent slopes	Fine Sandy Loam (upper) Loam (lower)	Well Drained

Soil Type	Texture	Drainage Class
Prentiss silt loam, 0 to 2 percent Slopes	Silt Loam (upper) Loam (lower)	Moderately Well Drained
Stough loam, 0 to 2 percent Slopes	Loam (upper) Sandy Loam (lower)	Somewhat Poorly Drained
Freest sandy loam, 2 to 5 percent slopes	Sandy Loam (upper) Loam (lower)	Moderately Well Drained
Nugent and Jena soils, frequently flooded	Loamy Sand (upper) Stratified Sand to Fine Sandy Loam (lower)	Excessively Drained
Wadley loamy sand, 0 to 5 percent slopes	Loamy Sand (upper) Sandy Clay Loam (lower)	Somewhat Excessively Drained
Croatan and Johnston soils, frequently flooded	Muck (upper) Fine Sandy Loam (lower)	Very Poorly Drained
Udorthents	Loamy Sand (upper) Sandy Loam (lower)	Moderately Well Drained
Axis mucky sandy clay loam, frequently flooded	Mucky Sandy Clay Loam (upper) Sandy Loam (lower)	Very Poorly Drained
Handsboro mucky silt loam, frequently flooded	Mucky Silt Loam (upper) Muck (lower)	Very Poorly Drained
Maurepas muck, frequently Flooded	Muck	Very Poorly Drained
Bayou sandy loam, 0 to 1 percent slopes	Sandy Loam (upper) Sandy Loam (lower)	Poorly Drained
Harleston fine sandy loam, 0 to 2 percent slopes	Fine Sandy Loam (upper) Sandy Loam (lower)	Moderately Well Drained
Harleston fine sandy loam, 2 to 5 percent slopes	Fine Sandy Loam (upper) Sandy Loam (lower)	Moderately Well Drained
Columbus loam, 0 to 2 percent slopes, occasionally flooded	Loam (upper) Loam (lower)	Moderately Well Drained

Environmental Consequences for WCNH and Birds Proposed Alternatives B, C and D-(Preferred)

Environmental consequences affecting geology and substrates are discussed below. Table 3.4-4 lists the environmental consequences of each project activity to geology and substrates in the project area for the proposed alternatives.

Table 3.4-4: Proposed Alternatives B, C and D -Environmental Consequences to Geology and Substrates.

Restoration Measure	Alternative B: Grand Bay Land Acquisition			Alternative C: Grand Bay Habitat Management			Alternative D (Preferred): Grand Bay Land Acquisition and Habitat Management		
	Adverse Impact Duration	Adverse Impact Intensity	Beneficial Impact Duration	Adverse Impact Duration	Adverse Impact Intensity	Beneficial Impact Duration	Adverse Impact Duration	Adverse Impact Intensity	Beneficial Impacts Duration
Acquisition/ Preservation	long-term	minor	-	-	-	-	long-term	minor	-
Chemical Treatment	-	-	-	short-term	minor	-	short-term	minor	-
Mechanical Treatment	-	-	-	short-term	minor to moderate	-	short-term	minor to moderate	-
Prescribed Fire	-	-	-	short-term	moderate	-	short-term	moderate	-

Acquisition/Preservation: Acquisition and preservation would open new areas to recreational activities including hiking, fishing, bird watching, and camping. The increased public use could result in a long-term, minor, and adverse impact to soils due to potential compaction, but these would be limited to relatively small areas. Impacts would be applicable to proposed Alternatives B and D.

Chemical Treatment: Treatment activities could require the use of ATVs, pickups or other small equipment that could result in soil disturbance, rutting, and compaction. The use of equipment would result in a short-term, minor adverse impact to soils. Removal of nuisance species and replanting could result in short-term, minor, adverse impacts to soils. Impacts would be applicable to proposed Alternative C and D.

Mechanical Treatment: Activities include but would not be limited to use of brush-hog, mowing, disking, and use of chainsaws. In addition, use of gyro tracs and in some cases bobcats or bulldozers to lay down or remove vegetation could be used. Turning over soils, soil compaction, disturbance and/or rutting from equipment use could result in short-term, minor to moderate, adverse impacts, depending on the size of the operation, soils wetness and season of the operation. To minimize these effects, care would be taken in the selection of equipment used and timing of operations, particularly in wetter conditions. Impacts would be applicable to proposed Alternative C and D.

Prescribed Fire: Preparations for prescribed fires could include installation of fire breaks, and use of light to heavy equipment to fell or lay down woody underbrush. Fire breaks would be constructed around the boundary of the burn unit by mechanical treatment and or disking. Soils would be turned and mineral soils layers exposed. Soil could be disturbed and compacted during the prescribed fire operations due to equipment use. Vegetation laydown/removal operations using light to heavy equipment could result in soil disturbance or rutting. In wet areas, soft track or wide track vehicles could be used to distribute the equipment weight and minimize impact. Alternatively, crews may remove material with chainsaws. There could be short-term, moderate, adverse impacts to mineral soil exposure, rutting, and soil disturbance during the site preparation and prescribed fire operations. Impacts would be applicable to proposed Alternative C and D.

Best Practices
The MS TIG would consider best practices referenced in Section 6.15 and Appendix 6A of the PDARP/PEIS. Additional best practices may be recommended for site-specific restoration measures and management activities in different locations due to differences in relevant conditions. The following best practices are contemplated and would be implemented to the extent practicable in order to avoid and minimize impacts to geology and substrates (soils):

- Allow revegetation of fire breaks or actively revegetate with native species or annual grasses, if prolonged period of greening up is anticipated.
- Develop and implement spill prevention and response plan, including conducting daily inspections during chemical treatment, mechanical treatment, and prescribed fire operations to ensure there are no leaks of antifreeze, hydraulic fluid, pesticide, or other substances.
- To the extent practicable, for equipment use in wet areas, soft tracked or wide tracked equipment should be used to distribute the equipment weight and minimize impacts to soils. Alternatively, crews may remove vegetative materials with chainsaws.

No Action Alternative
Under the No Action Alternative, the MS TIG would not implement any projects for the WCNH and Birds Restoration Types at this time, and would instead allow natural recovery processes to occur (outcomes described in Section 3.2). Natural recovery would take much longer compared to a scenario in which restoration actions were undertaken. Land use trends in the vicinity of the project area do not indicate that the parcels are at high risk of development in the foreseeable future. Under Alternatives B and D, if development were to occur, there would likely be impacts to soils. Acquiring the parcels would prevent them from being developed and from structures being constructed on them. Acquiring the parcels would place them under the purview of resource managers and management plans that would help conserve and protect the resource. Under Alternative C, the No Action Alternative would not provide the additional benefits to soils described above. The No Action Alternative does not meet the MS TIG's goals and objectives and does not provide the restoration benefit to WCNH and Birds that would occur through the Proposed Alternatives B-D.

3.4.1.2.2 Hydrology and Water Quality

Affected Environment
Section 3.3.2 of the PDARP/PEIS addresses river flows on the northern Gulf of Mexico 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. In the project area for the proposed alternatives, the affected resources consist of shallow water within bays, bayous, and wetlands within Grand Bay. Mississippi's water quality standards specify the appropriate levels for which various water quality parameters or indicators support a water body's designated use(s). Each use assessed for a water body is determined to be either "Attaining" or "Not Attaining" in accordance with the applicable water quality standards and U.S. Environmental Protection Agency (EPA) guidelines for assessments pursuant to § 305(b). A water body's use is said to be impaired when based on current and reliable site-specific data of sufficient quantity, quality, and frequency of collection it is not attaining its designated use(s). Where data and information of appropriate quality and quantity indicate non-attainment of a designated use or uses for an assessed water body, the water body will be placed on the Mississippi 2014 Section 303(d) List of Impaired Water Bodies (MDEQ 2014).

The proposed alternatives are in a region with abundant annual rainfall, receiving more than sixty-four (64) inches per year (USFWS 2008). The proposed alternatives are in the Mississippi Coastal Streams watershed, the Pascagoula Watershed, and the Escatawpa Watershed. These three watersheds include portions of George, Greene, Jackson, Wayne, Perry, Hancock, Harrison, Pearl River, and Stone counties; however, the project area for the proposed alternatives is exclusively in Jackson County. Major tributaries within the Mississippi Coastal Streams watershed include Bayou Casotte, Wolf River, Rotten Bayou, DeLisle Bayou, Bayou La Croix, Bayou Bacon/Jourdan River, Turkey Creek/Bernard Bayou, Biloxi River, and Tuxachanie Creek. Major tributaries within the Pascagoula River watershed include Okatoma Creek, Leaf River, Black Creek, Red Creek, Pascagoula River, Escatawpa River, Chickasawhay River, Thompson Creek, and Tallahala Creek.

Major rivers carry high sediment loads into the Mississippi Sound. Inland fresh water drainage from these and other smaller rivers create an estuarine environment. Variable salinity levels can affect the productivity and survival of organisms living in the area, as well as economic and recreational activities. Pollution from agriculture, improperly treated sewage, roadways, accidental oil spills, industry discharges, and other sources also affect the health of the habitats. Grand Bay is influenced by freshwater flow from Southwest Bayou, Middle Bayou, Clay Bayou, Bayou Cumbest and Bayou Heron. The Grand Bay Land Acquisition and Habitat Management proposed alternatives are located in waters classified by the State of Mississippi Water Quality Criteria for Intrastate, Interstate, and Coastal Waters (MDEQ 2012) as “shellfish harvesting[45]”, “recreation[46]”, and “fish and wildlife[47]” (Bang’s Lake), and “recreation” and “fish and wildlife[48]” for all other areas in the project location. Bayou Cumbest, which drains directly into Grand Bay, is listed as impaired on the State of Mississippi 303(d) list (MDEQ 2014) for Organic Enrichment/Low Dissolved Oxygen.

Floodplains

A large portion of the proposed alternative area is mapped as Zone VE. Zone VE is defined as Coastal flood zone with velocity hazard. This includes beach areas, open water and most estuarine marsh. Some estuarine marsh, streams, and riparian areas in the proposed alternative project area are mapped as Zone AE. Zone AE is defined as "Base Flood Elevations Determined". Upland areas in the proposed alternative project area are mostly Zone X. Zone X are defined as "Areas of 0.2% annual change flood; areas of 1% annual chance flood with average depths of less than 1 foot or with drainage areas less than 1 square mile; and areas protected by levees from 1% annual chance flood".

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[45] Waters in the shellfish harvesting classification are for propagation and harvesting shellfish for sale or use as a food product.
[46] Waters in the recreation classification are to be suitable for recreational purposes, including such water contact activities as swimming and water skiing.
[47] Waters in the fish and wildlife classification are intended for fishing and for propagation of fish, aquatic life, and wildlife.
[48] Waters that meet the Fish and Wildlife criteria are also be suitable for secondary contact recreation.

Wetlands
The project area for the proposed alternatives is a mosaic of wetlands and uplands extending from the open water, salt pannes in Grand Bay up to mesic and wet savanna and flatwoods near I-10. Wetlands in the proposed alternative project area include forested freshwater scrub shrub wetlands, coastal marsh, wet savannas and flatwoods, and freshwater marsh (See Habitats in Section 3.4.1.3).

Environmental Consequences for WCNH and Birds Proposed Alternatives B, C and D-(Preferred)
Environmental consequences affecting hydrology, water quality, floodplains and wetlands are discussed below.

Hydrology
Table 3.4-5 lists the environmental consequences of each project activity to hydrology and water quality in the project area for the proposed alternatives.

Table 3.4-5: Proposed Alternatives –Environmental Consequences to Hydrology and Water Quality.

Restoration Measure	Alternative B: Grand Bay Land Acquisition			Alternative C: Grand Bay Habitat Management			Alternative D (Preferred): Grand Bay Land Acquisition and Habitat Management		
	Adverse Impact Duration	Adverse Impact Intensity	Beneficial Impact Duration	Adverse Impact Duration	Adverse Impact Intensity	Beneficial Impact Duration	Adverse Impact Duration	Adverse Impact Intensity	Beneficial Impact Duration
Hydrology									
Acquisition/ Preservation	-	-	long-term	-	-	-	-	-	long-term
Chemical Treatment	-	-	-	short-term	minor	-	short-term	minor	-
Mechanical Treatment/ Prescribed Fire	-	-	-	short-term	minor to moderate	-	short term	minor to moderate	-
Water Quality									
Acquisition/ Preservation	-	-	long-term	-	-	-	-	-	long-term
Chemical Treatment	-	-	-	short-term	minor	-	short-term	minor	-
Mechanical Treatment/ Prescribed Fire	-	-	-	short-term	minor to moderate	-	short-term	minor to moderate	-

<u>Acquisition/Preservation</u>: Acquisition and preservation would open new areas to recreational activities including hiking, fishing, bird watching, and camping. Preservation of lands would have indirect, long-term, benefits to both hydrology and water quality by preventing development and disturbances, and stormwater infrastructure. Beneficial impacts would be applicable to proposed Alternative B and D.

Chemical Treatment: There could be short-term, minor impacts to hydrology as a result of minor rutting/soil disturbance and temporary changes in hydrologic patterns from vehicular transport of personnel to treatment areas. Impacts would be applicable to proposed Alternatives C and D.

Mechanical Treatment/Prescribed Fire: Mechanical treatment would apply to up to 6,276 acres of savannas and flatwoods. Since large equipment may be needed, soil disturbance, rutting, compaction could have short-term, minor to moderate, adverse impact to hydrology. There could be small, temporary changes to stormwater flows and runoff retention patterns due to rutting by equipment and vegetation removal resulting in a short-term, minor to moderate, adverse impact to hydrology. There would be short-term, minor to moderate, adverse impacts to hydrology resulting from mechanical treatment of woody underbrush and construction of fire breaks. There could be small, temporary changes to stormwater flows and runoff retention patterns due to rutting by equipment and vegetation removal. Soft track or wide track equipment would be used in wet areas to the extent practicable. Alternately, crews may remove vegetative material with chainsaws. Impacts would be applicable to proposed Alternative C and D.

Water Quality

Table 3.4-5 lists the environmental consequences of each project activity to water quality in the project area for the proposed alternatives.

Acquisition/Preservation: Acquisition and preservation would open new areas to recreational activities including hiking, fishing, bird watching, and camping. Access using motorized vehicles would be limited. Preservation of lands would have indirect, long-term benefits by preventing development and disturbances, which could reduce surface water runoff and result in long-term water quality benefits to Grand Bay. Impacts would be applicable to proposed Alternative B and D.

Chemical Treatment: Chemical treatment activities would include the use of herbicides. There could be unavoidable spills near the intended application area. However, best practices would be used to prevent any harmful chemicals from entering the environment. Implementation of best practices that the MS TIG would consider, described in Section 3.4.1.2.1 above includes development and implementation of a spill prevention and response plan, including conducting daily inspections during chemical treatment to ensure there are no leaks of pesticides or other substances. Personnel applying chemicals would follow all warning labels on chemical containers and proper permits would be secured prior to treatment activities. As such, this activity would have short-term, minor, adverse impact, if any, on water quality and wetlands (described below). Impacts would be applicable to proposed Alternative C and D.

Mechanical Treatment/Prescribed Fire: Mechanical treatment would apply to up to 6,276 acres of savannas and flatwoods. Since large equipment may be needed, soil disturbance, rutting, compaction and any resulting rutting and compaction could have short-term, minor to moderate, adverse impact to water quality. There could be small, temporary changes to stormwater flows and runoff retention patterns and resulting sediment movement due to rutting by equipment and vegetation removal resulting in a short-term, minor to moderate, adverse impact to water quality. Similar impacts could result from mechanical treatment of woody underbrush and construction of fire breaks. Soft tracked or wide tracked equipment would be used in wet areas to the extent practicable. Alternately, crews may remove vegetative material with chainsaws. In addition, appropriate erosion control plans would be developed as necessary to prevent sediment movement from the mechanical treatment/prescribed fire area. Impacts would be applicable to proposed Alternative C and D.

Floodplains

Acquisition and preservation of land in perpetuity would prevent land development in floodplains. There would be a long-term benefit to floodplains. Chemical treatment, mechanical treatment, and prescribed fire operations would not result in a detectable change to natural and beneficial floodplain values. Impacts would be applicable to proposed Alternative B and D.

Wetlands

Table 3.4-6 is a summary of proposed alternatives impacts to wetlands.

Table 3.4-6: Proposed Alternatives -Environmental Consequences to Wetlands.

Restoration Measure	Alternative B: Grand Bay Land Acquisition			Alternative C: Grand Bay Habitat Management			Alternative D (Preferred): Grand Bay Land Acquisition and Habitat Management		
	Adverse Impact Duration	Adverse Impact Intensity	Beneficial Impact Duration	Adverse Impact Duration	Adverse Impact Intensity	Beneficial Impact Duration	Adverse Impact Duration	Adverse Impact Intensity	Beneficial Impact Duration
Wetlands									
Acquisition/ Preservation	-	-	long-term	-	-	-	-	-	long-term
Chemical Treatment	-	-	-	short-term	minor	-	short-term	minor	-
Mechanical Treatment	-	-	-	short-term	minor to moderate	long-term	short-term	minor to moderate	long-term
Prescribed Fire	-	-	-	short-term	minor to moderate	long-term	short-term	minor to moderate	long-term

Acquisition/Preservation: There would be a long-term benefit to wetlands from acquisition and preservation. Wet savannas and flatwood, forested freshwater scrub shrub, freshwater marsh, and coastal marsh areas that are acquired would not be impacted for development. Impacts would be applicable to proposed Alternative B and D.

Chemical Treatment: Chemical treatment activities would require the use of herbicides and equipment during application. Personnel applying chemicals would follow all warning labels on chemical containers and proper permits would be secured prior to treatment activities. Only chemicals approved for use in wetlands would be used. Equipment traffic in wetlands would be avoided to the extent practicable. Best practices would be used during the application of herbicides. Accidental spillage could result in short-term, minor, adverse impacts to wetland habitat. However, best practices would be used to prevent any harmful chemicals from entering the environment and for clean up if a spill occurred. Impacts would be applicable to proposed Alternative C and D.

Mechanical Treatment: Mechanical treatment in wetland areas would be done in a manner that would minimize impacts to soil to the extent practicable. In wet areas, soft track or wide track equipment would be used to distribute the equipment weight and minimize impact. Alternatively, crews may remove material with chainsaws. If required, a USACE permit would be obtained likely a Nationwide 27 (Aquatic Habitat Restoration, Establishment, and Enhancement Activities), as well as a MDMR Coastal Wetlands Permit (if required). Nationwide 27 allows for mechanized land clearing to remove non-native invasive, exotic, or nuisance vegetation and other related activities. If there is any clearing within wetlands or stream boundaries, damage to vegetation, soil compaction and any resulting erosion could have a short-term, minor to moderate impact to wetlands. USACE permit and/or MDMR Coastal Wetlands permit conditions (if required) would be adhered to in all operations. There would be long-term benefits to wet savannas and flatwoods from mechanical treatment including establishment of more native flora and increased diversity in flora and fauna. Impacts would be applicable to proposed Alternative C and D.

<u>Prescribed Fire</u>: Prescribed fire would apply to up to 6,276 acres of savannas and flatwoods, a portion of which, are likely wetlands. Intermittent fires were historically a critical perturbation in for this habitat. There would be short-term, minor to moderate impacts resulting from mechanical treatment of woody underbrush and construction of fire breaks if the fire breaks are in wetlands or streams; the impacts, permit requirements and minimization measures are discussed above in mechanical treatment. There would be long-term beneficial effects to wet fire-suppressed pine savannas including a re-establishment of wetland communities, and increased diversity in flora and faunal populations that colonized the prescribed fire unit. Impacts would be applicable to proposed Alternative C and D.

Best Practices
The MS TIG would consider best practices referenced in Section 6.15 and Appendix 6A of the PDARP/PEIS. Additional best practices may be recommended for site-specific restoration measures and management activities in different locations due to differences in relevant conditions. The following best practices are contemplated and would be implemented to the extent practicable in order to avoid and minimize impacts to water quality and hydrology:

- In the execution of land acquisition and the design of habitat management measures the MS TIG would consider resiliency measures to facilitate habitat migration due to sea level rise.
- To avoid water quality impacts an erosion control plan will be developed and could consist of the use of vegetative buffers (100 feet or greater), revegetation with native species or annual grasses, and any other measures needed to prevent sediment from reaching protected species or their habitats.
- For chemical treatment, personnel applying chemicals would follow all warning labels on chemical containers and proper permits would be secured prior to treatment activities. Personnel will apply herbicide in accordance with the direction and guidance provided on the appropriate U.S. Environmental Protection Agency (EPA) labels and state statutes during land-based activities.
- Soft track or wide track equipment would be used in wet areas to the extent practicable. Alternatively, crews may remove vegetative material with chainsaws.
- Avoid and minimize, to the maximum extent practicable, placement of dredged or dill material in wetlands and other aquatic resources. Design construction equipment corridors to avoid and minimize impacts to wetlands and other aquatic resources to the maximum extent practicable. If required, a USACE permit would be obtained; likely a Nationwide 27 (Aquatic Habitat Restoration, Establishment, and Enhancement Activities) as well as MDMR Coastal Wetlands Permit (if required). USACE permit and/or MDME Coastal Wetlands permit conditions (if required) would be adhered to in all operations.

- Designate a vehicle staging area removed from any natural surface water resource or wetland to perform fueling, maintenance, and storage of construction vehicles and equipment. Inspect vehicles and equipment daily prior to leaving the storage area to ensure that no petroleum or oil products are leaking.
- Develop and implement a spill prevention and response plan, including conducting daily inspections of all construction and related equipment to ensure there are no leaks of antifreeze, hydraulic fluid, or either substances and cleaning and sealing all equipment that would be used in the water to rid it of chemical residue.
- Control dust related to construction site activities through a Soil Erosion Sediment Control Plan that includes spraying of a suppressing agent on dust piles (non-hazardous, biodegradable).
- Cover trucks hauling loose materials.

No Action Alternative
Under the No Action Alternative, the MS TIG would not implement any projects for the WCNH and Birds Restoration Types at this time, and would instead allow natural recovery processes to occur (outcomes described in Section 3.2). Natural recovery would take much longer compared to a scenario in which restoration actions were undertaken. Land use trends in the vicinity of the project area do not indicate that the parcels are at high risk of development in the foreseeable future. Under Alternatives B and D, if development were to occur, there would likely be adverse impacts to hydrology, water quality, floodplains, and wetlands. Adverse hydrologic affects could include increased runoff rates due to impervious surfaces related to development. Increases in sediment entering waterways could result in adverse effects to water quality. Floodplain and wetland function could be adversely affected by development of parcels proposed for acquisition, preservation and management under proposed WCNH and Birds Alternatives B and D. Under Alternative C, the No Action Alternative would not provide the additional benefits to hydrology, water quality, floodplains, and wetlands described above. The No Action Alternative does not meet the MS TIG's goals and objectives and does not provide the restoration benefit to WCNH and Birds that would occur through the Proposed Alternatives B-D.

3.4.1.2.3. Air Quality and Greenhouse Gas Emissions

Affected Environment
The following section is a discussion of air quality for the project area for the proposed alternatives. EPA has set national ambient air quality standards (NAAQS) for six principal air pollutants (also called criteria pollutants): Ground-Level Ozone (O3), Particulate Matter (PM), Nitrogen Dioxide (NO2), Sulfur Dioxide (SO2), Carbon Monoxide (CO), and Lead (Pb). MDEQ is the state agency responsible for development and maintenance of state specific air emission standard for Mississippi, and monitors all of these pollutants. In Jackson County, the following parameters are monitored: Ozone, Particulate Matter, Nitrogen Oxides, and Sulfur Dioxide. According to MDEQ 2015 Air

Quality Data Summary[49] the entire state of Mississippi, including Jackson County, is meeting all of the NAAQS.

Environmental Consequences for WCNH and Birds Proposed Alternatives B, C and D-(Preferred)
The environmental consequences for this section is divided into two discussions: 1- environmental consequences from equipment operation/best practices and; 2- environmental consequences resulting from prescribed fire/best practices.

<u>1-Environmental Consequences Resulting From Equipment Operation and associated Best Practices:</u> The following project implementation activities would produce emissions during equipment operation: chemical treatment and mechanical treatment. Because these restoration activities would occur seasonally, and would be limited in scope and distribution, the impacts on air quality or to emissions of greenhouse gases would be short-term and minor.

Best Practices
Unavoidable short-term and minor adverse impacts from equipment emissions would be offset through the following best practices measures to the extent practicable:

- Shut down idling construction equipment, if feasible.
- Encourage the use of the proper size of equipment for the job to maximize energy efficiency.
- Use of ultra-low sulfur diesel fuel in off-road construction equipment with engine horsepower (HP) rating of 60 HP and above.

<u>2- Environmental Consequences Resulting from Prescribed Fire and associated Best Practices</u>: The use of prescribed fires is included in this project as a restoration activity to provide major long-term benefits for native species habitats, water and soil quality, and nutrient cycling.[50] However, short-term moderate adverse impacts to air quality and greenhouse gases may occur during the prescribed fire events because fire produces smoke, which is primarily composed of water vapor and carbon dioxide but also contains carbon monoxide, nitrogen oxide, hydrocarbons, particulate matter, and trace minerals. According to the National Coalition of Prescribed Fire Councils Guide to Smoke Management (September 2007 version),[51] the primary concerns of smoke as an air pollutant are as follows:

- Carbon Dioxide: The emission factor for carbon dioxide for prescribed fire is 2,000-3,500 pounds/ton (pounds of emissions/ton of organic matter burned).

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[49]http://www.deq.state.ms.us/mdeq.nsf/pdf/Air_2015AirQualityDataSummary/$File/2015%20Air%20Quality%20Data%20Summary.pdf
[50] https://www.nrcs.usda.gov/Internet/FSE_DOCUMENTS/16/stelprdb1046311.pdf
[51]http://www.garxfire.com/pdf%20files/The_National_Coalition_of_Prescribed_Fire_Councils_Guide_to_Smoke_Management.pdf

- Carbon monoxide: The emission factor for carbon monoxide for prescribed fire is 20-500 pounds/ton. It is classified as a criteria pollutant by EPA. As a result of rapid dilution and its instability, carbon monoxide emissions from prescribed fires are not a concern to the general public.
- Water vapor: The emission factor for water vapor for prescribed fire is 50-1500 pounds/ton. The only possible concern about water vapor is visibility reduction in the vicinity of the fire.
- Particulate matter: The emission factor for particulate matter for prescribed fire is 20-180 pounds/ton. Particulates are a criteria pollutant and can impact health and visibility. Particulates are presently the major pollutant of concern from prescribed fires. They represent a health risk by inhalation and also reduce visibility.
- Hydrocarbons: The emission factor for hydrocarbons for wildland fire is 10-40 pounds/ton. While hydrocarbons are not a criteria pollutant, they may impact health and visibility and in some cases, may contribute to excessive ozone concentrations.
- Nitrogen oxides: The emission factor for nitrogen oxides for wildland fire is 1-9 pounds/ton. Nitrogen oxides are a criteria pollutant and can impact health and visibility. The low emission factor reduces concern of ambient air quality standards on a local level; however, nitrogen oxides can affect ozone formation.
- Secondary emissions: Secondary emissions are pollutants which are formed in the atmosphere by photochemical transformation of primary emissions. They include oxidants such as ozone which is a criteria pollutant. Specific emission factors from prescribed fires are unknown but are believed to be relatively small.
- Air Toxics: There is an emerging concern about the potential emission of air toxics (acetaldehyde, acrolein; 1, 3 butadiene; formaldehyde; and polycyclic organic matter (POM). POM includes eight major categories of compounds including polycyclic aromatic hydrocarbons (PAHs) which include numerous chemicals which can be emitted from fire.

Adverse impacts to air quality by prescribed fires would be minimized by the frequency and timing of the events; typically, they would be conducted every 1-3 years on managed burn areas according to the management plan. Unavoidable short-term moderate adverse impacts from prescribed fires would be offset through the development of a Prescribed Fire Plan, which would include some or all of the following Best Smoke Management Practices (BSMPs) and would be part of the management plan. These BSMPs were developed by USDA Forest Service/NRCS[52] (October 2011) to mitigate the impacts of smoke to public health (See Section 3.3.1.4.5), public safety and nuisance, and visibility. These six BSMPs have applicability depending on the type of fire, fuel to be burned, and level of effort needed to address air quality concerns. BSMPs are utilized by the individual fire manager and may be an expectation of a state-wide smoke management program and any applicable conservation plans which are in place for the proposed project area.

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[52] https://www.nrcs.usda.gov/Internet/FSE_DOCUMENTS/16/stelprdb1046311.pdf

Table 3.4-7: Summary of Basic Smoke Management Practices.

Basic Smoke Management Practice	Benefit achieved with the BSMP	When the BSMP is Applied
Evaluate Smoke Dispersion Conditions	Minimize smoke impacts	Before, During, After
Monitor Effects on Air Quality	Be aware of where the smoke is going and degree it impacts air quality	Before, During, After
Record-Keeping/Maintain a Burn/Smoke Journal	Retain information about the weather, burn and smoke. If air quality problems occur, documentation helps analyze and address air regulatory issues	Before, During, After
Communication- Public Notification	Notify neighbors and those potentially impacted by smoke, especially sensitive receptors	Before, During
Consider Emission Reduction Techniques	Reducing emissions can reduce downwind impacts	Before, During
Share the Airshed – Coordination of Area Burning	Coordinate multiple burns in the area to manage exposure of the public to smoke	Before, During, After

No Action Alternative

Under the No Action Alternative, the MS TIG would not implement any projects for the WCNH and Birds Restoration Types at this time, and would instead allow natural recovery processes to occur (outcomes described in Section 3.2). Natural recovery would take much longer compared to a scenario in which restoration actions were undertaken. Land use trends in the vicinity of the project area do not indicate that the parcels are at high risk of development in the foreseeable future. Under Alternatives B and D, if development were to occur, there would likely be adverse impacts to air quality due the potential of development, the additional traffic and other air pollution related to development, and removal of vegetation that benefits air quality. Under the No Action Alternative, prescribed fire would not take place as an additional management activity, resulting in no additional short-term, minor to moderate impacts to air quality from fires. This short-term impact however would be offset by the potential for development with its resultant potential for long-term impacts. The No Action Alternative does not meet the MS TIG's goals and objectives and does not provide the restoration benefit to WCNH and Birds that would occur through the proposed alternatives.

3.4.1.3 Biological Environment

Introduction to Affected Environment (Biological Environment): Biological environment resources discussed in the section include habitats, wildlife, and protected species. PDARP/PEIS Sections 3.4, 3.5, and 3.6 are incorporated by reference here. The affected environment for the proposed alternatives biological environment is described in respective sections below.

Programmatic Review of Environmental Consequences (Biological Environment): Sections 6.4.1.1.2 and 6.4.10.1.2 of the PDARP/PEIS describe the impacts to Biological Resources for the restoration approaches being considered for the proposed alternative. Specific restoration activities identified as part of land management plans could result in short-term, minor to moderate adverse effects on conservation areas. Consequences reviewed in the PDARP/PEIS are incorporated here and summarized.

PDARP/PEIS consequences related to invasive species: Activities that may occur on conserved lands may result in introduction of invasive species. Use of best practices would help prevent the introduction of invasive species. Implementation of land management plans, located within or near restoration activities, could result in disturbed, removed, or altered habitats, which could cause minor to moderate, short- and long-term adverse effects on species that use those habitats for forage or nesting purposes.

PDARP/PEIS consequences related to public access: Land acquisition could permit public access for recreational use. This public use, depending on management stipulations, could result in long-term, minor to moderate adverse effects on area species through increased human presence and activity on acquired habitats.

PDARP/PEIS consequences related to habitat migration: Conservation of habitat through fee title acquisition and improved management could have a long-term benefit to any habitat on the property acquired or protected. Conservation would also allow for upland migration of beach, wetland, or other habitats as the sea level rises and could limit development encroachment.

PDARP/PEIS consequences related to habitat: Conservation of habitat through fee title acquisition could have a long-term benefit to fish, birds, and terrestrial wildlife through the protection of coastal, riparian, or terrestrial habitat. These habitats can be important for food supply and various life stages of some species. Benefits of the proposed restoration approach include conservation of bird nesting and foraging habitat that would increase bird health and reproduction by preventing habitat loss through land conversion.

PDARP/PEIS consequences related to access restriction: Restrictions on seasonal or overall human use that could result from changes in land management would reduce habitat degradation. Improvements in habitat associated with this approach may draw additional visitors to the area, resulting in potential indirect adverse impacts from human presence. Human disturbance can lead to failure of nests, increased egg and chick predation, or even total colony abandonment.

PDARP/PEIS consequences related to vegetation management: Managing vegetation is a common restoration technique to enhance habitat for specific bird species. Reducing vegetation on beaches, for example, can provide nesting and foraging habitat for birds such as such as snowy plover, least tern, black skimmer, and American oystercatcher. Conversely, adding vegetation can provide habitat for other bird species such as wading birds and brown pelicans. Common vegetation management methods include mechanical treatments, application of pesticides or herbicides, and biological control to manage plant species.

Environmental consequences for the proposed alternative are within the general range impacts as described in the PDARP/PEIS with some variances related to specific actions. As appropriate in a tiered analysis, the evaluation the proposed alternative focuses on the specific resources with a potential to be affected. Marine and estuarine fauna are not expected to be affected by the proposed alternative as there is no in-water work. To avoid redundant or unnecessary information, marine and estuarine fauna are evaluated summarily here.

Marine and Estuarine Fauna (Submerged Aquatic Vegetation, Nearshore Benthic Invertebrates, Marine Mammals, and Essential Fish Habitat): There would be no in-water work. Estuarine marsh would be acquired and preserved, but there are limited management activities planned. Acquisition and preservation of habitat would prevent development in and adjacent to this habitat and preclude habitat removal or stresses that could result from shoreline development.

For the biological environment, the following resources are further analyzed in this section:

- Habitats;
- Protected Species;
- Migratory Birds; and
- Wildlife.

3.4.1.3.1. Habitats

Affected Environment
Section 3.5 of the PDARP/PEIS provides a discussion of habitats of the northern Gulf of Mexico; Section 3.7.4 covers invasive species. Grand Bay is part of the Mississippi coastal bays and estuaries system, which also includes St. Louis Bay, Biloxi Bay, Back Bay of Biloxi, Pascagoula Bay, and Graveline Bay. Grand Bay is comprised of estuarine and non-estuarine wetland marsh habitat. The estuarine system is semi-enclosed with areas open access to the Gulf of Mexico, resulting in seawater that is occasionally diluted with freshwater runoff and flow. However, large volumes of freshwater do not regularly enter the Grand Bay system and salinities in the Grand Bay system are regularly recorded above 30 parts per thousand (ppt) (Grand Bay National Estuarine Research Reserve 2013). This open water estuarine area supports oyster reefs and seagrass habitats. The intertidal areas support a variety of marsh types and extensive, unvegetated salt flats. The non-tidal areas include wet pine savannas, coastal bayhead and cypress swamps, freshwater marshes, and maritime forests (Grand Bay National Estuarine Research Reserve 2013).

For the purposes of this RP/EA, the MS TIG has grouped habitats and incorporated by reference the descriptions of those habitats provided in previous plans including:

- Grand Bay National Wildlife Refuge Comprehensive Conservation Plan (USFWS 2008);
- Grand Bay NERR Management Plan 2013-2018 (GBNERR 2012); and
- Land Protection Plan and Final Environmental Assessment for the Expansion of Grand Bay National Wildlife Refuge (USFWS 2012).

Within the project area for the proposed alternatives, coastal wetland and nearshore habitats include forested freshwater scrub-shrub, coastal marsh, savannas and flatwoods, freshwater marsh, beach, and open water (Figure 3.4-2).

<u>Forested Freshwater Scrub-Shrub</u>: Approximately 3,311 acres of forested freshwater scrub-shrub exists within the project area for the proposed alternatives, 1,416 acres within acquisition parcels. This habitat was described in detail in the Grand Bay National Wildlife Refuge Comprehensive Conservation Plan (USFWS 2008), and is comprised of the following habitats: pine scrub, short scrub, tall scrub and pocosin.

Coastal Marsh: Approximately 9,080 acres of coastal marsh exists in the project area for the proposed alternatives, 2,007 acres within acquisition parcels. This habitat was described in detail in the Grand Bay National Wildlife Refuge Comprehensive Conservation Plan (USFWS 2008) and the Grand Bay NERR Management Plan (MDMR 1998). This habitat is comprised of estuarine marsh, tidal marsh, and intertidal marsh.

Savannas and Flatwoods: Approximately 6,276 acres of savannas and flatwoods exists in the project area for the proposed alternatives, 3,535 within acquisition parcels. This habitat was described in detail in the Grand Bay National Wildlife Refuge Comprehensive Conservation Plan (USFWS 2008) and the Grand Bay NERR Management Plan (MDMR 1998). This habitat is comprised of the following habitat types: pine savannas and flatwoods, mesic pine savanna, wet pine savanna, mesic pine flatwoods, pond cypress savannas, and maritime forest.

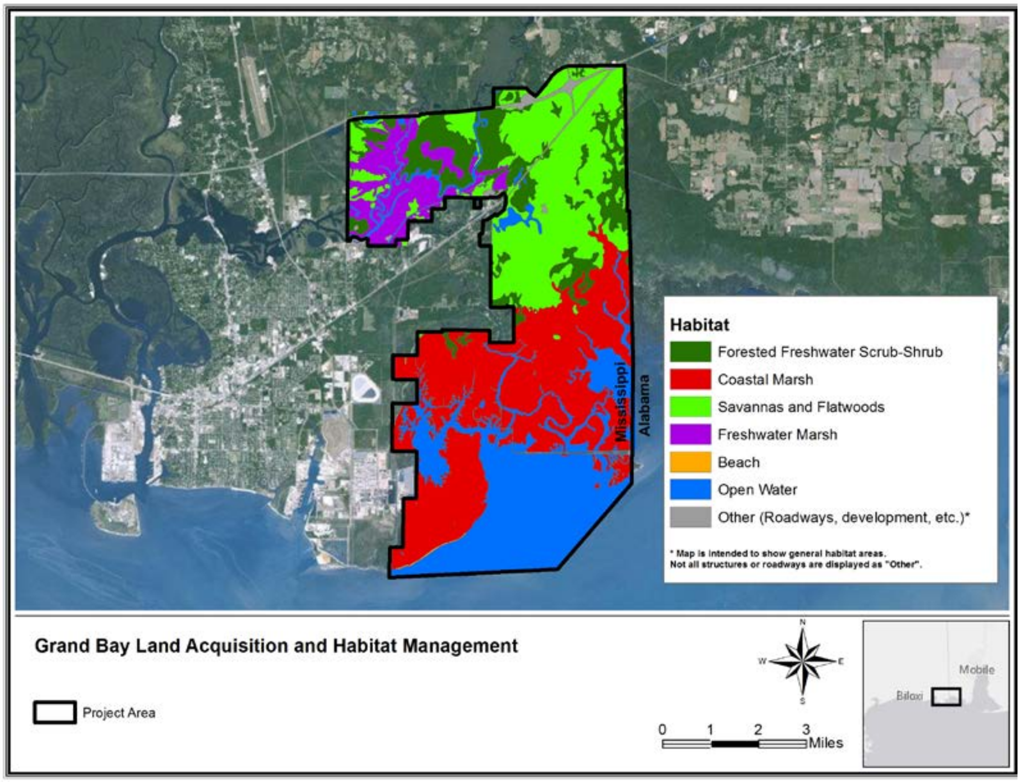
Freshwater Marsh: Approximately 1,937 acres of freshwater marsh exists in the project area for the proposed alternatives, 1,207 acres within acquisition parcels. This habitat was described in detail in the Grand Bay NERR Management Plan (MDMR 1998).

Beach: Approximately 21 acres of beach exists in the project area for the proposed alternatives.

Open Water: Approximately 7,189 acres of open water exists in the project area for the proposed alternatives.

Invasive Species EO 13112 applies to all federal agencies whose actions may affect the status of invasive species, requires agencies to identify such actions, and to the extent practicable and permitted by law, requires agencies to 1.) take actions specified in the Order to address the problem consistent with their authorities and budgetary resources and 2.) not authorize, fund, or carry out actions that they believe are likely to cause or promote the introduction or spread of invasive species in the United States or elsewhere unless pursuant to guidelines that it has prescribed, the agency has determined and made public its determination that the benefits of such actions clearly outweigh the potential harm caused by invasive species; and that all feasible and prudent measures to minimize risk of harm will be taken in conjunction with the actions. The proposed alternative habitat management is primarily invasive species management with restoration actions and measures including chemical treatment, mechanical treatment and prescribed fire. Best practices that would be used to control or eliminate invasive species are discussed in the environmental consequences section below.

Figure 3.4-2: Grand Bay Land Acquisition and Habitat Management –Habitats.



Environmental Consequences for WCNH and Birds Proposed Alternatives B, C and D- (Preferred)

A summary of proposed restoration activities and their potential adverse and beneficial impacts are listed in Table 3.4-8 and discussed in this section.

Table 3.4-8: Proposed Alternatives-Environmental Consequences to Habitat due to the Proposed WCNH and Birds Alternatives B, C and D (Preferred).

Habitats	Acquisition/Preservation	Chemical Treatment	Mechanical Treatment	Prescribed Fire
Forested Freshwater Scrub-Shrub				
Adverse Impact Duration	-	short-term	short-term	-
Adverse Impact Intensity	-	minor	minor	-
Beneficial Impact Duration	long-term	long-term	long-term	-

Habitats	Acquisition/Preservation	Chemical Treatment	Mechanical Treatment	Prescribed Fire
Coastal Marsh				
Adverse Impact Duration	-	short-term	short-term	-
Adverse Impact Intensity	-	minor	minor	-
Beneficial Impact Duration	long-term	long-term	long-term	-
Savannas and Flatwoods				
Adverse Impact Duration	-	short-term	short-term	short-term
Adverse Impact Intensity	-	minor	minor to moderate	minor to moderate
Beneficial Impact Duration	long-term	long-term	long-term	long-term
Freshwater Marsh				
Adverse Impact Duration	-	short-term	short-term	-
Adverse Impact Intensity	-	minor	minor	-
Beneficial Impact Duration	long-term	long-term	long-term	-
Beach				
Adverse Impact Duration	-	-	-	-
Adverse Impact Intensity	-	-	-	-
Beneficial Impact Duration	long-term	-	-	-

Acquisition and Preservation: There would long-term benefits to acquiring and preserving habitats; see table 3.4-8. Benefits would be applicable to proposed Alternative B and D.

Chemical Treatment: In forested freshwater scrub-shrub, coastal marsh, savannas and flatwoods, and freshwater marsh, chemical treatment would be in small areas. There would be no chemical treatment in beach habitat. There would be short-term minor impacts associated with accessing habitats and, if applicable, short-term impacts from any accidental spills. Care would be taken to obtain permits and handle chemicals as per manufactures instruction, particularly in aquatic systems. There would be long-term benefits from chemical treatment including control, prevention or elimination of Cogon grass, Chinese tallow, privet, Japanese climbing fern and other nuisance species and the resulting increase in diversity of native flora. Chemical treatment may be applied in combination with mechanical treatment and prescribed fire (discussed below). Impacts and benefits would be applicable to proposed Alternative B and D; see Table 3.4-8.

Mechanical Treatment: In forested freshwater scrub-shrub, coastal marsh, and freshwater marsh, mechanical treatment activities would likely be limited to clearing by hand or with small tools such as chainsaws. Physical disturbance from site access and dragging of vegetation, etc. would result in short-term, minor impacts. There would be a long-term benefit from mechanical treatment including control, eradication or prevention of the spread of nuisance species including Chinese tallow, privet, and other woody shrubs/invasive species; long-term benefits would also include a resulting increase in diversity of plant community flora.

For savanna and flatwoods, mechanical treatment activities include but would not be limited to use of brush-hog, use of chainsaws, use of gyro tracs and in some cases bobcats or bulldozers to lay down or remove vegetation. These treatments could be used alone or in combination and also in preparation for prescribed fire. These would be short-term, minor to moderate impacts depending on the sizes of the treatment and intensity of treatment needed. There would be long-term benefits including increased diversity of flora, once nuisance species are controlled, eradicated or prevention measures are underway.

Mechanical treatment in wetter savanna and flatwoods would be done in a manner that would minimize impacts to soil to the extent practicable. In wet areas, soft track or wide track equipment would be used to distribute the equipment weight and minimize impact. Alternatively, crews may remove material with chainsaws. If required, a U.S. Army Corps of Engineers permit would be obtained likely a Nationwide 27 (Aquatic Habitat Restoration, Establishment, and Enhancement Activities), as well as a MDMR Coastal Wetlands Permit (if required). Nationwide 27 allows for mechanized land clearing to remove non-native invasive, exotic, or nuisance vegetation and other related activities. If there is any clearing within wetlands or stream boundaries, damage to vegetation, soil compaction and any resulting erosion could have a short-term, minor to moderate impact to wetlands. USACE permit and/or MDMR Coastal Wetlands permit conditions (if required) would be adhered to in all operations. Impacts from mechanical treatment would be applicable to proposed Alternative C and D.

Prescribed Fire: Prescribed fire would apply to up to 6,276 acres of savanna and flatwoods. The preferred prescribed fire regime would be completed on a two-year rotation, with 50% of the prescribed fires occurring during the growing season, if possible given that weather conditions, seasonal wetness, availability of trained staff, invasive species presence and other factors are considerations in maintaining the fire frequency. These activities would largely be applied in areas that were colonized by woody invasive and understory shrubs such as gallberry (*Ilex glabra*), privet, saw palmetto, Chinese tallow, and other species. Impacts to soils and wetland were discussed in previous section. Prescribed fire could result in short-term, minor to moderate, adverse impacts, to existing habitats depending on the size of the operation. There would be long-term benefits to savanna and flatwoods from prescribed fire by creating conditions that would result in the re-establishment of diverse plant communities. There could also be incidental burning of freshwater marsh, when prescribed fire escapes during burning of adjacent habitats. These are periodic, unplanned occurrences. Resource managers typically allow the fires to spread through the marsh. Impacts would be applicable to proposed Alternative C and D.

Best Practices
The MS TIG would consider best practices referenced in Section 6.15 and Appendix 6A of the PDARP/PEIS. Additional best practices may be recommended for site-specific restoration measures

and management activities in different locations due to differences in relevant conditions. The following best practices are contemplated and would be implemented to the extent practicable in order to reduce the spread of invasive species:

- Prior to bringing any equipment (including personal gear, machinery, vehicles, or vessels) to the work site, inspect each item for mud or soil, seeds, and vegetation. If present, clean the equipment, vehicles, or personal gear until they are free from mud, soil, seeds, and vegetation.
- Inspect the equipment, vehicles, and personal gear each time they are being prepared to go to a site or prior to transferring between sites to avoid spreading exotic, nuisance species.

No Action Alternative

Under the No Action Alternative, the MS TIG would not implement any projects for the WCNH and Birds Restoration Types at this time, and would instead allow natural recovery processes to occur (outcomes described in Section 3.2). Natural recovery would take much longer compared to a scenario in which restoration actions were undertaken. Land use trends in the vicinity of the project area do not indicate that the parcels are at high risk of development in the foreseeable future. Under alternatives B and D, if development were to occur, there would likely be adverse impacts to habitats including habitat removal and/or fragmentation. If the parcels were to be developed, the habitats would be altered or removed completely constituting an adverse impact. When compared to Alternatives C and D, the No Action Alternative would not provide the habitat benefits associated with management activities. The No Action Alternative does not meet the MS TIG's goals and objectives and does not provide the restoration benefit to WCNH and Birds that would occur through the proposed alternatives.

3.4.1.3.2 Protected Species

Affected Environment

Section 3.6 of the PDARP/PEIS discusses biota of the northern Gulf of Mexico. This section covers threatened and endangered species in the proposed alternative area. The USFWS and NOAA NMFS list species as threatened or endangered when they meet criteria detailed under the ESA. Additionally, MDWFP identifies and lists protected species. Section 7(a) (2) of the ESA requires that each federal agency ensure that any action authorized, funded, or carried out by the agency is not likely to jeopardize the continued existence of any endangered or threatened species or result in the destruction or adverse modification of Critical Habitat of those species. When the action of a federal agency may affect a protected species or its Critical Habitat, that agency is required to consult with either the NMFS or the USFWS, depending upon the protected species that may be affected.

To fulfill requirements and obligations under the ESA, the MMPA, the MBTA and the BGEPA, the MS TIG completed and submitted Biological Evaluation Forms to NOAA and USFWS for compliance with Section 7 of the ESA of 1973, as amended (16 U.S.C. § 1531 *et seq.*) and Section 101 of the MMPA, as amended (16 U.S.C. § 1371(a)(5) *et seq.*). The USFWS Ecological Services Field Office, Jackson, MS concurred by letter dated April 5, 2017 that the project is not likely to adversely affect piping plover, red knot, West Indian manatee, Mississippi sandhill crane, Alabama red-belly turtle, black pine snake, red-cockaded woodpecker, wood stork, gopher tortoise, and Louisiana quillwort. By memorandum dated March 29, 2017, the NOAA Restoration Center, Southeast Region determined that the proposed project will not affect Essential Fish Habitat (EFH) because there is no EFH in the project area or EFH will not be affected by proposed actions. By memorandum dated March 29, 2017, the NOAA Restoration Center, Southeast Region determined that the proposed project will have no effect on listed species under the jurisdiction of NMFS. The MS TIG coordinated with the USFWS and NOAA NMFS to determine that this project does not require authorization under the MMPA. Compliance with the MBTA and BGEPA are also discussed in this section.

Relevant federally protected species that are known to occur or could occur in Jackson County and that could occur in or near the project area for or could pass through the project area are listed in Table 3.4-9. A brief discussion of the state imperiled diamond back terrapin is also provided in the environmental consequences.

Table 3.4-9: Proposed Alternatives-Protected Species.

Common Name	Scientific Name	Federal Status	Habitat
Birds			
Piping plover/Critical Habitat	*Charadrius melodus*	Threatened	Beaches and mudflats in southeastern coastal areas. Critical Habitat, MS-15, exists in Jackson County
Red knot	*Calidris canutus rufa*	Threatened	Marine intertidal habitats including inlets, estuaries, and bays feeding in mud and sand flats on beaches and barrier islands
Mississippi sandhill crane	*Grus canadensis pulla*	Endangered	Open wetland habitats surrounded by shrubs or trees. Critical Habitat has been established on and adjacent to the Mississippi Sandhill Crane National Wildlife Refuge (USFWS 2013).
Red-cockaded woodpecker	*Picoides borealis*	Endangered	This species excavates nesting and roosting cavities in living pine trees, and is the only species known to do so exclusively. Cavities have been found in most species of southern pines, but longleaf pine appears to be the preferred species. Older, mature trees are selected for cavity excavation.
Wood stork	*Mycteria americana*	Threatened	Freshwater and estuarine wetlands, primarily nesting in cypress or mangrove swamps. They feed in freshwater marshes, narrow tidal creeks, or flooded tidal pools. Particularly attractive feeding sites are depressions in marshes or swamps where fish become concentrated during periods of falling water levels.
Fishes			
Gulf sturgeon/Critical Habitat	*Acipenser oxyrinchus desotoi*	Threatened	Migrates from large freshwater coastal rivers to brackish and marine coastal bays and estuaries. No in-water work will be conducted in the project area for the proposed alternatives.
Mammals			
West Indian manatee	*Trichechus manatus*	Endangered	Fresh and salt water in large coastal rivers, bays, bayous and estuaries

Common Name	Scientific Name	Federal Status	Habitat
Bottlenose dolphin	*Tursiops runcatus*	Protected	Bays, estuaries and river mouths as well as offshore
Reptiles/Amphibians			
Hawksbill sea turtle	*Eretmochelys imbricata*	Endangered	Coral reefs, open ocean, bays, estuaries
Leatherback sea turtle	*Dermochelys coriacea*	Endangered	Open ocean, coastal waters
Kemp's ridley sea turtle	*Lepidochelys kempii*	Endangered	Nearshore and inshore coastal waters, often in salt marshes; neritic zones with muddy or sandy substrate (NOAA Fisheries 2014b)
Green sea turtle	*Chelonia mydas*	Threatened	Shallow coastal waters with SAVs and algae, nests on open beaches
Loggerhead sea turtle	*Caretta coretta*	Threatened	Open ocean; also, inshore areas, bays, salt marshes, ship channels and mouths of large rivers
Alabama red-belly turtle	*Pseudemys alabamensis*	Endangered	Fresh and brackish habitats, river banks, submerged and emergent aquatic vegetation; upland habitat for nesting (MDWFP 2001; USFWS 2013)
Black pine snake	*Pituophis melanoleucus lodingi*	*Threatened*	Open canopy longleaf pine forest with herbaceous ground cover and well-drained sandy soils and, less so, hardwood forests (USFWS 2010)
Gopher tortoise	*Gopherus polyphemus*	Threatened	Well-drained, sandy soils, which allow easy burrowing; an abundance of diverse herbaceous ground cover; and an open canopy and sparse shrub cover, which allows sunlight to reach the ground floor (USFWS 2013)
Plants			
Louisiana quillwort	*Isoetes louisianensis*	Endangered	Perennial streams and banks in bottomland hardwood habitats likely with bald cypress and possibly the presence of stream macrophytes such as *Sparganium* spp. and *Orontium* spp. (USFWS 2012

Birds

Mississippi Sandhill Crane (*Grus canadensis pulla*): The Mississippi sandhill crane utilizes open pine savanna and wetland habitats. Critical Habitat has been established on and adjacent to the Mississippi Sandhill Crane National Wildlife Refuge (USFWS 2013).

Piping Plover (*Charadrius melodus*): The piping plover does not nest in Mississippi; however, this species uses Gulf Coast beaches and barrier islands for wintering (MDWFP 2001). Piping plovers use sparsely vegetated sand beaches, mudflats, and salt marshes for roosting and foraging. There is piping plover critical habitat in the area. Restoration measures will avoid piping plover critical habitat. As such, the project is not likely to adversely affect the species.

Red Knot (*Calidris canutus rufa*): In coastal Mississippi, the red knot is mainly a migratory species that uses coastal beaches and marine intertidal areas as stopover feeding locations or staging areas on the way to and from their wintering grounds in South America and breeding areas in the Arctic. Foraging on ocean beaches, mud and sand flats, and salt marshes occurs from March to April during the northward spring migration and September and October during the southward autumn migration (Niles et al. 2007; USFWS 2013). Red knots have been observed wintering on the Gulf Coast and are observed from October to March (USFWS 2013). The nonbreeding diet of this species includes marine invertebrates such as snails, crustaceans, and small mollusks including the coquina clam *(Donax variabilis),* which is common on Gulf coast beaches, and the dwarf surf clam *(Mulinia lateralis)* (Niles et al. 2007; USFWS 2013). Roosting and resting habitat includes areas above the high tide line such as reefs and high sand flats (USFWS 2013).

Red-cockaded Woodpecker (*Picoides borealis*): In Mississippi, this species has been recorded primarily from the southern two-thirds of the state. It has not been found in the Delta and only sporadically occurs in the northern counties. The red-cockaded woodpecker is a species of southern pine forests. The preferred nesting habitat is open, park-like, mature pine woodlands with few or no hardwood trees present. Preferred feeding habitats are pine stands with trees 23 cm (9 in.) and greater in diameter. These may or may not include a significant hardwood component. The red-cockaded woodpecker excavates nesting and roosting cavities in living pine trees, and is the only species known to do so exclusively. Cavities have been found in most species of southern pines, but longleaf pine (*Pinus palustris*) appears to be the preferred species. Older, mature trees are selected for cavity excavation (MS Museum of Natural Science 2014).

Wood Stork (*Mycteria americana Linnaeus*): In Mississippi, wood storks have been observed most frequently along the western edge of the state in those counties bordering the Mississippi River and with increasing frequency in some counties along the eastern edge of the state, although they may occur almost anywhere there are sloughs or swamps to provide feeding habitat. The Wood Stork occurs primarily in freshwater wetlands, including ponds, bayheads, flooded pastures, oxbow lakes, and ditches. Nesting usually occurs in bald cypress trees in swamps, although breeding has also been observed in mangroves (MS Museum of Natural Science 2014).

Fishes

Gulf Sturgeon (*Acipenser oxyrinchus desotoi*): This anadromous species migrates from coastal bays and estuaries to large coastal rivers in the spring for spawning and then returns to brackish and marine environments from October through March for foraging. The riverine spawning habitats for Gulf sturgeon in the State of Mississippi include the Mississippi, Pearl, and Pascagoula rivers (Ross et al.

2009; MDWFP 2001) but not the Biloxi and Tchoutacabouffa rivers (USFWS, GSMFC, and NMFS 1995; NMFS and USFWS 2009). The marine wintering areas where individuals have been observed are nearshore and barrier island habitats from the Pearl River east to the barrier islands (Ross et al. 2009). Winter habitat is mainly around Cat, Ship, Horn, and Petit Bois islands with nearshore observations likely due to migratory movements to and from these offshore islands (Rogillio et al. 2007; Ross et al. 2009). The coastal Mississippi Sound waters of the State of Mississippi are designated as Critical Habitat.

Gulf Sturgeon Designated Critical Habitat: The project area extends into Gulf sturgeon Critical Habitat in Mississippi coastal waters and near the shoreline (Unit 8-Lake Pontchartrain-Mississippi Sound). Critical Habitat was designated in 2003 by the National Marine Fisheries Service (NMFS) and was based on seven primary constituent elements (PCEs) essential for its conservation. None the restoration activities would be in open water. Therefore, the proposed alternative is expected to have No Effect on Gulf sturgeon and consultation with the U.S. Fish and Wildlife Service will not be requested.

Mammals

West Indian Manatee (*Trichechus manatus*): This species uses both fresh and saltwater habitats such as coastal rivers, bays, bayous, and estuaries. The manatee is an occasional visitor to Mississippi's coasts, although migration into the area is poorly understood. After wintering in Florida, and perhaps Mexico, manatees migrate northward during spring, including to Mississippi and Alabama waters, although these migrations are not well understood (Fertl et al. 2005). Manatees frequently seek out freshwater sources such as rivers and river mouths and have been known to be found near estuaries (Fertl et al. 2005). SAVs are the typical manatee forage material; however, manatees can also consume other aquatic vegetation, algae, and terrestrial vegetation (Fertl et al. 2005). None of the restoration activities would be in open water.

Bottlenose Dolphin (*Tursiops truncatus*): Bottlenose dolphins are a protected species found in temperate and tropical waters around the world. There are coastal populations that migrate into bays, estuaries and river mouths as well as offshore populations that inhabit pelagic waters along the continental shelf. There are no proposed restoration activities in open water.

Reptiles

Hawksbill Sea Turtle (*Eretmochelys imbricata*): Although this species uses various habitats such as the open ocean, bays, and estuaries throughout different life stages, it is mainly associated with coral reefs. This species nests in Florida from April to November (NOAA Fisheries 2014a). It likely does not nest in Mississippi and observations are rare in the state (MDWFP 2001; NOAA Fisheries 2014a). The main dietary items of this species are sponges and other invertebrates (NOAA Fisheries 2014a).

Leatherback Sea Turtle (*Dermochelys coriacea*): This species mainly inhabits the offshore open ocean; however, it does use nearshore coastal waters during nesting or feeding. Nesting for this species occurs in Florida from April through November. Their main forage item is jellyfish. This species migrates long distances from nesting to feeding areas. While not common, there have been sporadic observations of leatherback sea turtles in Mississippi waters (MDWFP 2001).

Kemp's Ridley Sea Turtle (*Lepidochelys kempii*): Typical habitat for this species includes nearshore and inshore coastal waters and often salt marshes and neritic zones with muddy or sandy substrate (NOAA Fisheries 2013b). This species has been observed in nearshore waters of the Mississippi Sound during migration and foraging and has been accidentally caught by shore-based fishermen (MDWFP 2001; Shaver and Rubio 2008). Females typically nest from May through July (NOAA Fisheries 2014b). Males potentially use Gulf of Mexico habitats all year and females presumably use the Mississippi Sound and barrier island habitats for foraging when not nesting (NOAA Fisheries 2014b). Kemp's ridley sea turtles do not nest in Mississippi (MDWFP 2001).

Green Sea Turtle (*Chelonia mydas*): This species typically prefers shallow coastal waters with SAVs and algae for foraging and nests on open beaches (NOAA Fisheries 2015). Nesting typically does not occur on mainland beaches and there is likely no Mississippi nesting at all (MDWFP 2001; NOAA Fisheries 2015). This species migrates long distances in the open ocean from nesting to feeding areas. Observations of this species in Mississippi are rare (MDWFP 2001).

Loggerhead Sea Turtle (*Caretta caretta*): Loggerhead habitat for foraging and migration includes open ocean, inshore areas, bays, salt marshes, ship channels, and mouths of large rivers. This sea turtle feeds on mollusks, fish, crustaceans, and other marine organisms. This species typically nests at night from late April through September (NOAA Fisheries 2014c). Although loggerheads occasionally use barrier islands for nesting, mainland nesting is rare (MDWFP 2001). Preferences for nesting beaches include high-energy coarse-grained beaches adjacent to the ocean that are narrow and steeply sloped (NOAA Fisheries 2014c). This species has been observed in nearshore waters of the Mississippi Sound during migration and foraging and has been accidentally caught by shore-based fishermen (MDWFP 2001).

Alabama Red-Belly Turtle (*Pseudemys alabamensis*): The habitat of the Alabama red-belly turtle includes fresh and brackish habitats, river banks, submerged and emergent aquatic vegetation, and upland habitat for nesting (MDWFP 2001; USFWS 2013). This species is mainly a freshwater species associated with river and stream channels and associated wetlands. Nesting occurs from mid-May to mid-July (MDWFP 2001).

Black Pine Snake (*Pituophis melanoleucus lodingi*): Suitable habitat includes open canopy longleaf pine forest with herbaceous ground cover and well-drained sandy soils and, less so, hardwood forests (USFWS 2010).

Gopher Tortoise (*Gopherus polyphemus*): The gopher tortoise uses well-drained to excessively well-drained upland soils. Tortoises require soils that are sandy enough to permit construction of burrows and open canopies that allow sufficient herbaceous plant growth and sunny areas in which to nest. In Mississippi, these areas often support a mixture of longleaf pine and scrub oaks.

Plants

Louisiana Quillwort (*Isoetes louisianensis*): The Louisiana quillwort has been observed in 10 counties in 174 streams within 17 watersheds (USFWS 2012a) throughout the State of Mississippi with the largest colony found in the DeSoto National Forest (USFWS 2012a). This species is found in all three coastal Mississippi counties (MDWFP 2001; USFWS 2012a) although none have been found near the proposed project area (MDWFP 2001). In coastal Mississippi, Louisiana Quillwort habitat includes perennial streams and banks in bottomland hardwood habitats likely with bald cypress and possibly the presence of stream macrophytes such as *Sparganium* spp. and *Orontium* spp. (USFWS

2012a). Earlier sources indicate that suitable habitat for this species consists of sand or gravel bars located in intermittent streams and associated riparian areas (MDWFP 2001). Louisiana Quillworts are sensitive to changes in hydrology, sedimentation, and alterations to the surrounding overstory (USFWS 2012a).

Environmental Consequences for WCNH and Birds Proposed Alternatives B, C and D-(Preferred)

PDARP/PEIS programmatic ESA consultations were developed with the National Marine Fisheries Services (NMFS 2016) and the U.S. Fish and Wildlife Service (USFWS 2016). Potential impacts to threatened or endangered species and their Critical Habitat are presented in Table 3.4-10. The MS TIG has completed coordination under the programmatic ESA consultations with the USFWS (USFWS 2017b) and with NMFS (NMFS 2017b). The project area in the southeast is adjacent to the Mississippi sound which is designated Critical Habitat for Gulf sturgeon. None of the restoration activities would be completed in open water. Thus, there would be no effect as a result of any restoration activity to in water species (and associated Critical Habitat), including Gulf sturgeon, West Indian manatee, and sea turtles; for this reason, they are not included in the environmental consequences discussion in Table 3.4-10.

Table 3.4-10: Proposed Alternatives-Protected Species Impacts.

Species /Critical Habitat	Applicable Habitats	Restoration Activities for Applicable Habitats	Potential Impacts to Species/Critical Habitat
Alabama red-belly turtle (*Pseudemys alabamensis*)	Freshwater Marsh Savannas and Flatwoods	Acquisition/Preservation Chemical/Mechanical Treatment Prescribed Fire	Restoration measures and management activities could affect species habitat. If there is potential habitat for the Alabama red-belly turtle, surveys would be conducted in potential habitat. Survey results would be considered in the design of the restoration measures and management activities to either avoid or minimize impacts to the species. Actions to minimize the potential for adverse effects include, but are not limited to, those listed in the Best Practices Summary Table (Appendix A) including erosion control and spill prevention plans. As such, the project is not likely to adversely affect the species.
Piping plover *(Charadrius melodus)* and Red Knot *(Calidris canutus rufa)*	Beach	Acquisition/Preservation	Restoration measures and management activities are not expected to adversely impact these species because they can vacate the area during implementation. This project is intended to have beneficial impacts to piping plover and red knot by maintaining and enhancing beach habitat. Restoration measures will avoid piping plover critical habitat. As such, the project is not likely to adversely affect the species.
Red-cockaded woodpecker (*Picoides borealis)*	Savannas and Flatwoods	Acquisition/Preservation Chemical treatment Mechanical treatment Prescribed fire	If habitat exists prescribed fire and mechanical treatment of upland areas may affect species habitat. Surveys should be conducted in areas where the species is likely to occur. Survey results would be considered in the design of the management and or restoration measures to either avoid or minimize impacts to the species. As such, the project is not likely to adversely affect the species.

Species /Critical Habitat	Applicable Habitats	Restoration Activities for Applicable Habitats	Potential Impacts to Species/Critical Habitat
Black pine snake (*Pituophis melanoleucus lodingi*)	Savannas and Flatwoods	Acquisition/Preservation Chemical treatment Mechanical treatment Prescribed fire	It is not likely that this exact habitat exists in the proposed alternative area because much of the habitat is characterized by dense canopy cover or existing disturbance. However, if the habitat does exist, prescribed fire and mechanical treatment of upland areas may affect species habitat. Surveys would be conducted in areas where the species is likely to occur. Survey results would be considered in the design of the management activities and restoration measures to either avoid or minimize impacts to the species. As such, the project is not likely to adversely affect the species.
Gopher tortoise (*Gopherus polyphemus)*	Savannas and Flatwoods	Acquisition/Preservation Chemical treatment Mechanical treatment Prescribed fire	Restoration measures and management activities could affect species habitat. Areas that are likely to contain the species will be surveyed; if burrows are identified, conservation measures detailed in the Best Practices Summary Table (Appendix A) will be implemented to avoid or minimize impacts. As such, the project is not likely to adversely affect the species.
Louisiana quillwort (*Isoetes louisianensis*)	Savannas and flatwoods, Forested freshwater scrub-shrub	Acquisition/Preservation Chemical treatment Mechanical treatment Prescribed fire	Restoration measures and management activities could affect the species. If mechanical or chemical treatment, road removal/repair, or culvert placement will be conducted within 165 feet of Louisiana quillwort suitable habitat (ephemeral, intermittent, 1st and 2nd order perennial freshwater streams), then a qualified biologist will conduct a survey for Louisiana quillwort. If debris removal is in Louisiana quillwort suitable habitat, a survey will be performed prior to debris removal operations. If the species is found, then protective measures outlined in the Best Practices Summary Table (Appendix A) will be implemented. As such, the project is not likely to adversely affect the species.
Mississippi sandhill crane *(Grus canadensis pulla)*	Savannas and flatwoods, Forested freshwater scrub-shrub	Acquisition/Preservation Chemical treatment Mechanical treatment Prescribed fire	Restoration measures and management activities could affect the species. If disturbed, this species can temporarily leave the area during the implementation of restoration measures and management activities. As such, the project is not likely to adversely affect the species.
Wood stork (*Mycteria americana Linnaeus*)	Freshwater Marsh, Forested freshwater scrub-shrub	Acquisition/Preservation Chemical treatment Mechanical treatment	Restoration measures and management activities could affect the species. If disturbed, this species can temporarily leave the area during the implementation of restoration measures and management activities. As such, the project is not likely to adversely affect the species.
Mississippi diamondback terrapin (*Malaclemys terrapin pileata*)	Beach	Acquisition/Preservation	There are no restoration activities planned for beach habitat other than access restriction; no adverse impacts are anticipated.

Best Practices
The MS TIG would consider best practices referenced in Section 6.15 and Appendix 6A of the PDARP/PEIS. Additional best practices may be recommended for site-specific restoration measures and management activities in different locations due to differences in relevant conditions. The MS TIG would continue to consult with the appropriate regulatory agency to further avoid or minimize impacts to these species in planning site-specific restoration measures and management activities. The following best practices derived from informal consultation with the USFWS (USFWS 2017c) would be implemented to the extent practicable in order to avoid and minimize impacts to protected species.

Alabama Red-Belly Turtle

Surveys will be conducted in potential habitat. Survey results will be considered in the design of the restoration measures and management activities to either avoid or minimize impacts to the species. Best management practices outlined in applicable erosion control plans and applicable spill prevention plans will be implemented to minimize the indirect impacts.

Black Pine Snake

Exemptions under Section 4(d) of the Endangered Species Act allow the following management activities within habitats occupied by the black pine snake: (1) Prescribed burning, including all fire break establishment and maintenance actions, as well as actions taken to control wildfires; (2) Herbicide application for invasive plant species control, site-preparation, and mid-story and understory woody vegetation control. All exempted herbicide applications must be conducted in a manner consistent with Federal law, including Environmental Protection Agency label restrictions; applicable State laws; and herbicide application guidelines as prescribed by herbicide manufacturers and; (3) All forest management activities that maintain lands in a forested condition, except for: (a) Conversion of longleaf-pine-dominated forests (>51 percent longleaf in the overstory) to other forest cover types or land uses; or (b) those activities causing significant subsurface disturbance, including, but not limited to, shearing, wind-rowing, stumping, disking (except during fire break creation or maintenance), root-raking, and bedding. Areas requiring mechanical treatment such as shearing, wind-rowing, stumping, disking, root raking and bedding are typically dominated by invasive woody shrub and tree species and are not suitable habitat (open canopy settings) for black pine snake. An assessment of habitat would be completed. Surveys would be conducted of areas that have potential black pine snake habitat. The results would be considered in the design of the management and or restoration measures to avoid or minimize impacts to the species. The Implementing Trustee would coordinate with the Jackson Field Office if help is needed on habitat identification of habitat, conducting of surveys and/or the development of practices on a site-specific restoration plan.

Gopher Tortoise

A qualified biologist will conduct gopher tortoise surveys in areas that have suitable habitat and if burrows are identified, the following conservation measures will be implemented to avoid or minimize impacts:

- Mechanical Treatment
  To the extent practicable, vegetation clearing within 13 feet of a gopher tortoise burrow would be conducted but with hand tools (i.e., weed trimmer, push mower, chainsaws). In

specific cases where the hand tool restriction imposes additional costs and time required to maintain mowed areas, the specific provisions for mowing operations with bush-hog or rotary cutters within 13 feet of active and inactive gopher tortoise burrows during the dormant season only (October through April) are as follows: the path of the tractor and mower will be directed so that tires do not cross directly over the burrow entrance, or plane of the underground burrow. However, tractors and mowers of sufficient width can be backed or pulled directly over the burrow apron, entrance, and its underground plane by straddling the wheels on either side of the burrow and apron. Whenever possible, mowing should be conducted in the winter to reduce the likelihood of gopher tortoises being active above ground. If practical, mowing should be planned for cloudy days when the temperatures are coolest. Heavy equipment will stay 14 M (13 ft.) from known gopher tortoise burrows. Heavy equipment includes tractors, crawler loaders, crawler dozer, backhoe/loader, front end loader, scraper pan, monitor grader, skid steers, forklift, hydraulic excavator, specialty tracked equipment, gyrotracks with roller choppers, and other equipment. Do not place or operate logging decks within 186 feet of an active or inactive burrow, the area where tortoises normally forage from their burrows. Do not sheer, root-rake, disc, bed or create windrows in habitat occupied by tortoises, which is represented as a 2.5-acre area with a radius of 186 feet around any active burrow.

- Chemical Treatment
  All motorized equipment should be kept a minimum of 4 Meters (13 ft.) from gopher tortoise burrows and herbicide applications should be conducted on foot. For foliar herbicide application to control shrubs and small hardwoods, use imazapyr, glyphosate, and/or triclopyr by directed ground spray if prescribed fire is not feasible or is ineffective due to inadequate fuel loads, unmanageable smoke hazards, prescribed fire permit bans and restrictions, or low expected mortality due to the size, density, and cover of shrubs and hardwoods. Do not aerially apply these or other herbicides. Revegetation - for artificial regeneration, do not plant more than 500 seedlings per acre. Design all practices in gopher tortoise habitat to minimize or avoid unintentional damage to non-target plants. This applies to all practices where vegetation is managed such as the use of herbicides or site prep/harvest equipment.

Louisiana Quillwort

If the restoration measure or management activity (i.e. mechanical or chemical treatment, and prescribed fire) will be conducted within 165 feet of Louisiana quillwort suitable habitat (ephemeral, intermittent, 1st and 2nd order perennial freshwater streams), then a qualified biologist will conduct a survey for Louisiana quillwort. If Louisiana quillwort is found, then the following protective measures should be adopted: No herbicides will be mixed or applied within 100 feet of Louisiana quillwort plants/colonies. Minimize turbidity and siltation from upstream and upslope land clearing activities. No land clearing will occur within 165 feet of streams containing Louisiana quillwort. Heavy equipment will not be used within a 165 ft. buffer area of Louisiana quillwort plants/colonies.

Piping Plover and Red Knot

Provide all individuals working on a restoration activities associated with the project with information in support of general awareness of piping plover or red knot presence and means to avoid birds and their critical or otherwise important habitats. Minimize vegetation planting in preferred habitats and avoid removal of wrack year-round along the shoreline.

Red-Cockaded Woodpecker

Avoid working within active red-cockaded woodpecker clusters (the minimum convex polygon containing the aggregation of cavity trees used by a group of red-cockaded woodpeckers and a 200-foot-wide buffer surrounding the polygon).

If avoidance is not possible or management activities in red-cockaded woodpecker suitable habitat are desired, conduct standard surveys to determine if the habitat is supporting any individuals or presence can be assumed. If red-cockaded woodpeckers are present (or assumed to be), avoid cavity trees and use of mechanized equipment during the non-nesting season (approximately April 1 through July 31).

If impacts to suitable foraging habitat (pines approximately 30 or more years old and within one-half mile of an active cavity tree) are proposed, conduct a foraging habitat analysis. Foraging habitat may need to be replanted post-project.

Design projects within red-cockaded woodpecker suitable habitat such that prescribed fire needs are not impeded.

Chemical Treatment

For chemical treatment, personnel applying chemicals would follow all warning labels on chemical containers. Personnel will apply herbicide in accordance with the direction and guidance provided on the appropriate U.S. Environmental Protection Agency (EPA) labels and state statutes during land-based activities.

Herbicides should not be applied within 60 feet of any endangered or threatened plant species (or plant species of concern), unless analysis indicates herbicide use is the best way to protect the species from invasive weeds or promote the species, and application methods are selective to the target plants being treated.

Prescribed Burn

Planning and implementation of prescribed burns should include measures to provide protection for known occurrences of threatened, endangered, sensitive, and locally rare species that are susceptible to damage or extirpation from fire injury.

All Restoration Measures

Erosion control measures should be applied in all ground-disturbing activities to reduce movement of bare soil and minimize direct delivery of sediment to streams or other water-bodies (including estuarine systems). Appropriate erosion control measures (installing water diversion, revegetation, mulch, silt fences, etc.) should be implemented as promptly as practical.

Planning and implementation of fire break construction, and other ground disturbing projects should include measures to provide protection for threatened, endangered, sensitive, and locally rare species that are susceptible to damage or extirpation from ground disturbance. These are referred to as “species sensitive to soil disturbance and species sensitive to recreational traffic.”

Provide all individuals working on restoration activities associated with the project with information in support of general awareness of and means to avoid impacts to protected species and their habitats present at the specific project site. ESA Section 7 consultation has been completed and the appropriate recommendations are incorporated into the proposed alternative. Because there is no in-water work, no effects to manatee are expected, and the Implementing Trustees determined that no take of manatee under ESA or MMPA would occur.

No Action Alternative

Under the No Action Alternative, the MS TIG would not implement any projects for the WCNH and Birds Restoration Types at this time, and would instead allow natural recovery processes to occur (outcomes described in Section 3.2). Natural recovery would take much longer compared to a scenario in which restoration actions were undertaken. Land use trends in the vicinity of the project area do not indicate that the parcels are at high risk of development in the foreseeable future. Under Alternatives B and D, if development were to occur, there would likely be adverse impacts to habitat that could be utilized by protected species. Habitats that protected species could use would not be protected from development under the No Action Alternative when compared to Alternatives B and D; however, no impacts would occur to protected species or designated critical habitats without conducting required consultations. There would be no benefits to habitat from management activities that would be provided under Alternatives C and D. The No Action Alternative does not meet the MS TIG's goals and objectives and does not provide the restoration benefit to WCNH and Birds that would occur through the proposed Alternatives B-D.

3.4.1.3.3 Migratory Birds

Affected Environment

Migratory bird species groups that could occur in the proposed alternatives project area include wading birds, shorebirds, seabirds, raptors, goatsuckers, waterfowl, doves and pigeons, and rails and coots (Table 3.4-11).

Table 3.4-11: Migratory Bird Species Groups Present in Project Area and Example Behaviors.

SPECIES	BEHAVIOR	SPECIES/HABITAT IMPACTS
Wading birds (herons, egrets, ibises)	Foraging, feeding, resting, roosting, nesting	Wading birds primarily forage and feed at the water's edge. As such, they may be impacted locally and temporarily by the project. It is expected that they would be able to move to another nearby location to continue foraging, feeding and resting. These birds primarily nest and roost in trees or shrubs (e.g., pines, *Baccharis*), and could utilize areas that will be managed by mechanical treatment and prescribed fire. Nesting surveys would be conducted before commencing restoration activities.
Shorebirds (plovers, oystercatchers, stilts, sandpipers)	Foraging, feeding, resting, roosting, nesting	Shorebirds forage, feed, rest, nest, and roost in the proposed alternative area. As such, they may be impacted locally and temporarily by the project. It is expected that they would be able to move to

SPECIES	BEHAVIOR	SPECIES/HABITAT IMPACTS
		another nearby location to continue foraging, feeding and resting. In the project area, these birds would primarily nest on beaches. There are no planned activities near shorebird nesting habitats.
Seabirds (terns, gulls, skimmers, double-crested cormorant, American white pelican, brown pelican)	Foraging, feeding, resting, roosting	Seabirds forage, feed, rest, and roost in the proposed alternative area. Terns and skimmers could utilize the beach habitat in the project area. As such, they may be impacted locally and temporarily by the project. It is expected that they would be able to move to another nearby location to continue foraging, feeding and resting. There are no activities planned near seabird nesting habitat.
Raptors (osprey, hawks, eagles, owls)	Foraging, feeding, resting, roosting, nesting	Raptors forage, feed, rest, roost, and nest in the proposed alternative area. As such, they may be impacted locally and temporarily by the project. It is expected that they would be able to move to another nearby location to continue foraging, feeding and resting. There are osprey nests in cleared pipeline rights-of-way and possibly in snags located near open water. Chemical treatment, mechanical treatment and prescribed fire could be completed in the vicinity of raptor nests. Nesting surveys would be conducted before commencing restoration activities.
Goatsuckers	Foraging, feeding, resting, roosting, nesting	Goatsuckers forage, feed, rest, nest, and roost in the proposed alternative area. However, they are nocturnal/crepuscular and therefore not active during the project work period. They nest in thickets and woodlands. Nesting surveys would be conducted before commencing restoration activities.
Waterfowl (ducks, loons, and grebes)	Foraging, feeding, resting, roosting, nesting	Waterfowl forage, feed, rest, nest and roost in the action area. As such, they may be impacted locally and temporarily by the project. It is expected that they would be able to move to another nearby location to continue foraging, feeding and resting. These birds primarily roost and nest in low vegetation. Restoration activities in forested freshwater scrub shrub, coastal marsh and freshwater marsh. Nesting surveys would be conducted before commencing restoration activities.
Doves and pigeons	Foraging, feeding, resting, roosting	Doves and pigeons could forage, feed, rest, and roost in the proposed alternative area. It is expected that they would be able to move to another nearby location to continue foraging, feeding and resting if disturbed by the project

SPECIES	BEHAVIOR	SPECIES/HABITAT IMPACTS
Rails and coots	Foraging, feeding, resting, roosting, nesting	Rails and coots forage, feed, rest, nest and roost in the proposed alternative area. As such, they may be impacted locally and temporarily by the project. It is expected that they would be able to move to another nearby location to continue foraging, feeding and resting if disturbed by the project. These birds primarily roost and nest in marshes, which are within the action area. Nesting surveys would be conducted before commencing restoration activities.

The MBTA implements various treaties and conventions among the United States, Canada, Japan, Mexico, and the former Soviet Union for the protection of migratory birds. Under MBTA, unless permitted by regulations, it is unlawful to pursue, hunt, take, capture, kill, attempt to take, capture, or kill, possess, offer for sale, sell, offer to barter, barter, offer to purchase, purchase, deliver for shipment, ship, export, import, cause to be shipped, exported, or imported, deliver for transportion, transport or cause to be transported, carry or cause to be carried, or received for shipment, transportation, carriage, or export, any migratory bird, part, nest, egg, or product, manufactured or not. USFWS regulations broadly define “take” under MBTA to mean “pursue, hunt, shoot, wound, kill, trap, capture, or collect, or attempt to pursue, hunt, shoot, wound, kill, trap, capture, or collect.”

The BGEPA prohibits anyone, without a permit issued by the Secretary of the Interior, from "taking" bald eagles, including their parts, nests, or eggs. BGEPA provides criminal penalties for persons who "take, possess, sell, purchase, barter, offer to sell, purchase or barter, transport, export or import, at any time or any manner, any bald eagle ... [or any golden eagle], alive or dead, or any part, nest, or egg thereof." Golden eagles are not present along the Gulf Coast.

The MMPA was enacted in 1972 in response to increasing concerns among scientists and the public that significant declines in some species of marine mammals were caused by human activities. The MMPA established a national policy to prevent marine mammal species and population stocks from declining beyond the point where they ceased to be significant functioning elements of the ecosystems of which they are a part. DOC, through the NMFS, is charged with protecting whales, dolphins, porpoises, seals, and sea lions. Walrus, manatees, otters, and polar bears are protected by DOI through the USFWS. The MMPA established a moratorium on the taking of marine mammals in U.S. waters. It defines “take” to mean “to hunt, harass, capture, or kill” any marine mammal or attempt to do so. The MMPA further defines “harass” as any act of pursuit, torment, or annoyance that has the potential to disturb a marine mammal or marine mammals stock in the wild by causing disruption of natural behavioral patterns (Level B harassment).

Environmental Consequences for WCNH and Birds Proposed Alternatives B, C and D-(Preferred)

Migratory birds could use areas at and around the project area for foraging, feeding, resting, and nesting. Nesting species include raptors, wading birds, marsh birds, waterfowl and shorebirds; Table 3.4-11. For all planned restoration activities, pre-commencement nesting surveys for migratory birds and raptors within the restoration activity area would be conducted and if evidence of nesting is found, resource managers would coordinate with the USFWS to develop and implement appropriate conservation measures, such as those described below. Due to the implementation of best management practices no “take” of nesting birds is anticipated. There are no golden eagles in the project footprint. Raptor nest surveys would be completed within the restoration activity area where raptor nesting habitat exists. If evidence of nesting is found, resource managers coordinate with the USFWS to develop and implement appropriate conservation measures, therefore no impacts to golden or bald eagles are anticipated. Potential adverse effects to birds include elevated noise levels due to the use of mechanical equipment for vegetation clearing, and from noise and smoke during prescribed fires. These species are mobile and would likely exit the area during management activities (no impacts to overall population). Foraging and resting birds may temporarily be displaced during management activities. Bird roosting would not be affected because management activities would occur during daylight hours. Therefore, impacts are expected to be short-term, localized, and minor.

Best Practices
The MS TIG would consider best practices referenced in Section 6.15 and Appendix 6A of the PDARP/PEIS. Additional best practices may be recommended for site-specific restoration measures and management activities in different locations due to differences in relevant conditions. The following best practices derived from informal consultation with the USFWS (USFWS 2017c) would be implemented to the extent practicable in order to avoid and minimize impacts to migratory bird species including bald eagles:

Migratory Birds

Pre-work nesting surveys for migratory birds and raptors will be conducted and if evidence of nesting is found, resource managers will coordinate with USFWS Jackson, MS field office to develop appropriate conservation measures. These species are mobile and would likely exit the area during implementation of restoration measures and management activities (no impacts to overall population). The following best practices will be implemented to the extent practicable in order to avoid or minimize impacts to migratory bird species including bald eagles:

- Use care to avoid birds when operating machinery or vehicles near birds.
- Avoid working in migratory bird nesting habitats during breeding, nesting, and fledging (approximately mid-February through late August). If restoration measures or management activities must occur during this timeframe and breeding, nesting, or fledging birds are present, contact the state trust resource agency to obtain the most recent guidance to protect nesting birds or rookeries, and their recommendations will be implemented.
- Conservation areas may already be marked to protect bird nesting areas. Stay out of existing marked areas.
- If vegetation clearing is necessary, clear vegetation outside the migratory bird nesting season (approximately mid-February through late August) or have a qualified biologist inspect for active nests. If no active nests are found, vegetation may be removed. If active nests are found, vegetation may be removed after the nest successfully fledges.

Bald Eagles

- If bald eagle breeding or nesting behaviors are observed or a nest is discovered or known, have all activities avoid the nest by a minimum of 660 feet. If the nest is protected by a vegetated buffer where there is no line of sight to the nest, then the minimum avoidance distance is 330 feet. Maintain this avoidance distance from the onset of breeding/courtship behaviors until any eggs have hatched and eaglets have fledged (approximately 6 months).

- If a similar activity (such as driving on a roadway) is closer than 660 feet to a nest, maintain a distance buffer as close to the nest as the existing tolerated activity. If a vegetated buffer is present and there is no line of sight to the nest and a similar activity is closer than 330 feet to a nest, then maintain a distance buffer as close to the nest as the existing tolerated activity.
- In some instances, activities conducted within 660 feet of a nest may result in disturbance, particularly for the eagles occupying the Mississippi barrier islands. If an activity appears to cause initial disturbance, stop the activity and move all individuals and equipment away until the eagles are no longer displaying disturbance behaviors. Contact the USFWS's Migratory Bird Permit Office to determine how to avoid impacts or if a permit may be needed.

The MS TIG completed coordination and review of the project for impacts to bald eagles and migratory birds in accordance with the BGEPA of 1940 (16 U.S.C. §§ 668-668c), the MBTA of 1918 (16 U.S.C. §§ 703–712), and the MMPA to ensure appropriate conservation measures and best practices would be incorporated into the project.

No Action Alternative

Under the No Action Alternative, the MS TIG would not implement any projects for the WCNH and Birds Restoration Type at this time, and would instead allow natural recovery processes to occur (outcomes described in Section 3.2). Natural recovery would take much longer compared to a scenario in which restoration actions were undertaken. Land use trends in the vicinity of the project area do not indicate that the parcels are at high risk of development in the foreseeable future. Habitats that these species could use would not be as protected from development under the No Action Alternative when compared to Alternatives B and D. However, under Alternatives B and D, even if development were to occur, migratory birds and bald/golden eagles would still be protected under federal statute. Enhancements to potential habitat that these species utilize would not take place under the No Action Alternative when compared to Alternatives C and D. The No Action Alternative does not meet the MS TIG's goals and objectives and does not provide the restoration benefit to WCNH and Birds that would occur through the proposed alternatives.

3.4.1.3.4 Wildlife

Affected Environment

Section 3.6 of the PDARP/PEIS discusses the biota of the northern Gulf of Mexico. For the proposed alternative project area, the Grand Bay NWR Comprehensive Conservation Plan (USFWS, 2008) is incorporated by reference. That plan provides a discussion of a number of species including grassland birds, migratory birds, waterfowl, marshbirds, landbirds, amphibians, reptiles, and the Mississippi sandhill crane. Goals and objectives for these species within that plan include:

- Grassland birds: providing pine savanna habitat for the benefit of these species;
- Other migratory birds: improving knowledge base for management by increasing baseline knowledge of the distribution, abundance and use of the refuge by a variety of birds, including waterfowl, marsh birds, and landbirds;

- Amphibians and reptiles: continuing monitoring their presence through surveys and considering projects that might benefit their populations while pursuing primary Mississippi sandhill crane-oriented goals and objectives of refuge;
- Fire management: proactively using prescribed fire for habitat management and fuel reduction objectives in a rapidly developing area with ever more constraints that must be observed by fire managers;
- Manage and protect migratory birds;
- Achieve goals (savanna restoration, fire, roll chopping, etc.) to meet refuge purpose of establishing breeding pairs of Mississippi sandhill cranes; and
- After fire, conduct migratory bird surveys in savanna.

Management actions to achieve the goals and objectives are also outlined in the Grand Bay NWR Comprehensive Conservation Plan.

Environmental Consequences for WCNH and Birds Proposed Alternatives B, C and D-(Preferred)

Table 3.4-12 summarizes the environmental consequences to wildlife from the proposed alternatives. A discussion is provided below.

Table 3.4-12: Summarized proposed alternative impacts on wildlife.

Restoration Measure	Alternative B: Grand Bay Land Acquisition			Alternative C: Grand Bay Habitat Management			Alternative D (Preferred): Grand Bay Land Acquisition and Habitat Management		
	Adverse Impact Duration	Adverse Impact Intensity	Beneficial Impact	Adverse Impact Duration	Adverse Impact Intensity	Beneficial Impact	Adverse Impact Duration	Adverse Impact Intensity	Beneficial Impact
Acquisition/ Preservation	-	-	long-term	-	-	-	-	-	long-term
Chemical Treatment	-	-	-	short-term	minor to moderate	long-term	short-term	minor to moderate	long-term
Mechanical Treatment	-	-	-	short-term	minor to moderate	long-term	short-term	minor to moderate	long-term
Prescribed Fire	-	-	-	short-term	minor to moderate	long-term	short-term	minor to moderate	long-term

Acquisition/Preservation: Prevention of development of habitats would be a long-term, benefit to wildlife species that currently inhabit or transiently utilize the preserved habitats. Impacts would be applicable to proposed Alternatives B and D.

Chemical and Mechanical Treatment/Prescribed Fire: Chemical treatment is often used in combination with fire or mechanical treatment. Invasive species management approaches would result in a short-term, minor to moderate impacts to wildlife species in and near treatment areas due to equipment noise, mechanical treatment, exposure to chemicals and prescribed fires. Mechanical treatment and prescribed fire would be the most intrusive; however, these techniques would be applied to areas that have dense woody shrub layers which preclude utilization by a number of bird and mammal species. There would be a short term, minor to moderate impact to species in the area during mechanical treatment and prescribed fire. Many species would leave the area during the operations, but would likely return to utilize the restored habitats. Mechanically treated and/or prescribed fire areas would become open habitat and be colonized with native pine savanna species over several seasons. These communities are one of the most diverse habitats and would result in increased diversity in insect, bird, and small mammal populations. Improved savanna and flatwoods would provide high quality habitat for grassland birds. Fire management applied to up to 6,276 acres of savannas and flatwoods would not only meet resource manager fuel reduction objectives, but would also enhance habitat for the Mississippi sandhill crane habitat, and benefit other migratory birds. Adverse and beneficial impacts from invasive species management treatments including chemical, mechanical and prescribed fire would be applicable to proposed Alternatives C and D.

No Action Alternative
Under the No Action Alternative, the MS TIG would not implement any projects for the WCNH and Birds Restoration Type at this time, and would instead allow natural recovery processes to occur (outcomes described in Section 3.2). Natural recovery would take much longer compared to a scenario in which restoration actions were undertaken. Land use trends in the vicinity of the project area do not indicate that the parcels are at high risk of development in the foreseeable future. Under Alternatives B and D, if development were to occur, there would likely be adverse impacts to habitats that wildlife species use. The development resulting from the No Action Alternative could cause additional human disturbance, such as noise would increase with development and could cause adverse impacts to wildlife. Wildlife habitat would not be enhanced under the No Action Alternative like it would in Alternatives C and D. The No Action Alternative does not meet the MS TIG's goals and objectives and does not provide the restoration benefit to WCNH and Birds that would occur through the proposed alternatives.

3.4.1.4 Socioeconomic Environment

Introduction to Affected Environment (Socioeconomic Resources): The section provides a discussion of socioeconomic resources and environmental justice, tourism and recreation, cultural resources, land and marine management, and public health and safety. PDARP/PEIS Section 3.2 is incorporated by reference here.

Programmatic Review of Environmental Consequences (Socioeconomic Resources): Sections 6.4.1.5.3 and 6.4.10.1.3 of the PDARP/PEIS describe the impacts to Human Use and Socioeconomic Resources for the relevant restoration approaches and are incorporated by reference and briefly described here.

PDARP/PEIS consequences related to economic effects: Acquisition and preservation could have long-term, minor to moderate adverse economic effects if acquisition prevents or limits development. Acquisition could permanently limit the amount and type of development permitted, and the management and intensity of use on these properties would likely change. Ownership changes and/or permitted uses could affect property taxes and have broader regional economic impacts. Land acquisition could have a minor to moderate impact on socioeconomic resources due to changes in visitor spending and tax impacts. The transfer of fee title to lands are transactions negotiated or arranged between willing parties and, as such, are not expected to give rise to adverse socioeconomic impacts to those who choose to engage in such transactions.

PDARP/PEIS consequences related to recreation and tourism: The acquisition of lands to protect habitat could result in impacts to recreation and tourism opportunities depending on site-specific land management practices applied. Closures, such as fencing or other mechanisms to protect nest sites, could result in short-term (seasonal) prohibitions on public access. Restrictions on public access in areas where public access had previously been allowed could reduce recreational opportunities. Over the long term, these techniques could result in healthy populations and provide wildlife enthusiasts with increased wildlife viewing opportunities. Conservation or acquisition of natural land resources can have indirect benefits on fish and wildlife habitat, potentially resulting in increased fishing and hunting opportunities. Seasonal or permanent employment could increase in order to provide labor for the installation, maintenance, and implementation of management projects such as hunting or trapping. Minor, short-term adverse impacts could result due to restoration activities. However, improvements in habitat associated with this approach may draw additional visitors to the area with associated visitor spending, increasing sales and tax receipts on retail purchases.

PDARP/PEIS consequences related to cultural resources: Creating, enhancing, or restoring bird nesting habitat may result in minor (temporary disturbance) to moderate (disturbance without loss of cultural information) impacts on cultural and historic resources depending on the scale of the action and site-specific characteristics. Discovery or recovery of cultural or historic resources would allow their future protection.

As appropriate in a tiered analysis, the evaluation the proposed alternative focuses on the specific resources with a potential to be affected. Infrastructure, fisheries and aquaculture, marine transportation, aesthetics and visual resources would have negligible to minor adverse effects or would provide benefits. To avoid redundant or unnecessary information, a summary of environmental consequences for these resources is provided here.

Infrastructure: There would be no impact to infrastructure from land acquisition activities associated with Alternative B. Infrastructure on the site includes logging roads for timber management, gas pipelines and utility corridors. There could be short-term, minor adverse impacts to gas pipelines or utility corridors from activities (minor clearing, temporary crossings) associated with mechanical treatment and prescribed fire (Alternative C and D; preferred). Care would be taken to identify utility corridors as part of project planning and prior to implementation or restoration measures.

Fisheries and Aquaculture: There would be limited low impact activities in open water or estuarine marsh. Alternatives B, C and D acquisition and restoration measures could benefit marine resources in Grand Bay project area. Alternative B, C and D could provide net reduction in sediment movement resulting from preservation and restoration versus a development/build out scenario of lands proposed for acquisition.

Marine Transportation: There would be no restoration activity that would occur in open water; the proposed alternative would not have an impact on marine transportation.

Aesthetics and Visual Resources: There would be no impact from Alternative B, land acquisition. Prescribed fire would result in a change in viewshed (Alternatives C and D-preferred). There may be temporary short-term minor impacts as a result of smoke. The land may look scorched after a prescribed fire until vegetation regrows. Depending on weather conditions, burn units can revegetate ("green up") within days to weeks. Revegetation after fire would result in a viewshed of natural vegetation with increased diversity of flowering plants and fauna (Alternatives C and D-preferred).

For the socioeconomic environment, the following resources are further analyzed in this section:

- Socioeconomics and Environmental Justice
- Tourism and Recreational Use
- Cultural Resources
- Land and Marine Management
- Public Health and Safety

3.4.1.4.1 Socioeconomic Resources and Environmental Justice

Affected Environment

PDARP/PEIS Section 3.2 discusses socioeconomic resources of the Gulf Coast and is incorporated by reference here. The project area for the proposed alternatives is located within Jackson County, Mississippi. The Grand Bay NWR Comprehensive Conservation Plan summarizes the socioeconomic environment for the proposed alternatives and is incorporated here by reference (USFWS, 2008). Jackson County is three times more densely populated than the state (181 persons per square mile vs. 61 persons per square mile) and growing faster. In 2003, the county's estimated population was 133,928, about five percent of Mississippi's population of 2,881,281 (U.S. Census Bureau 2005). The county population grew by 1.9 percent from 2000 to 2003, compared to Mississippi's 1.3 percent growth in the same three years. From 1990 to 2000, Jackson County grew 14 percent compared to Mississippi's 10.5 percent in the same decade.

Over the last decade, residential and commercial development has been proceeding rapidly in the coastal portion of Jackson County, Mississippi, converting forest plantations and farm fields into developed lots with houses, businesses, and institutions. Open space and habitat are becoming more and more fragmented. This development is expected to continue over the foreseeable future, in part because of the desirability of living in a coastal county with beach and ocean.

The affected environment includes portions of the populations of Census Tract 401.2, 413, 416, and 427; and 411, specifically the residents close to the Grand Bay. Census Tract 427 makes up most the population affected. Small portions of Census Tracts 413 and 401.2 are within the project area; and only a few parcels within Census Tract 413 are within the project area. The population of Jackson County was 139,668 in 2010 and accounted for 4.7% of the state's total population, while Census Tract 427 (population 1,016 in 2010) accounted for <1% of the county population (Table 3.4-13). In 2010, median household income in Jackson County was $49,145, which was 25% higher than the median household income in the State of Mississippi ($39,464). Median household income of Census Tract 427 in 2014 was $48,317, which is 1.6% lower than that of the county and 22% higher than the median household income of the state (U.S. Census Bureau, 2010-2014 American Community Survey 5-Year Estimates).

Table 3.4-13: Population data (http://www.census.gov/2010census/popmap/).

Topic	Mississippi		Jackson County		Census Tract 401.2		Census Tract 413		Census Tract 416		Census Tract 427	
2010 Total Population	2,967,297		139,668		7,569		6,504		2,557		1,016	
White alone	1,754,684	59%	100,735	72%	7,328	97%	5,000	77%	294	11%	862	85%
Black or African American Alone	1,098,385	37%	30,034	22%	79	1%	1,322	20%	2,178	85%	122	12%
Asian alone	25,742	<1%	3,023	2.2%	28	<1%	39	<1%	3	<1%	2	<1%
American Indian and Alaska Native alone	15,030	<1%	565	<1%	20	<1%	21	<1%	3	<1%	6	<1%
Native Hawaiian and Other Pacific Islander alone	1,187	<1%	79	<1%	2	<1%	5	<1%	0	0%	0	0%
Some Other Race alone	38,162	1.3%	2,610	1.9%	45	<1%	38	<1%	44	1.7%	19	1.8%
Two or More Races	34,107	1.1%	2,622	1.9%	67	1%	79	1.2%	35	1.4%	5	<1%

Environmental Consequences for WCNH and Birds Proposed Alternatives B, C and D-(Preferred)

Acquisition and preservation of property in fee and the set-aside in perpetuity would permanently limit development (Alternative B). The change in ownership would affect property taxes paid to local governments and could result in a broader regional economic impact resulting from changes in visitor spending in the area. There could be minor increases in spending resulting from recreational access to the project area as it increases in size and opportunities to hike, view wildlife in the area, or attract recreation on the basis of eco-tourism in the region are enhanced. Land acquisition could have a minor to moderate impact on socioeconomic resources due to changes in visitor spending and tax impacts. The transfer of fee title to lands would be transactions negotiated or arranged between willing parties and, as such, are not expected to give rise to adverse socioeconomic impacts to those who choose to engage in such transactions. Executive Order 12898 directs federal agencies to make achieving environmental justice part of its mission by identifying and addressing, as appropriate, disproportionately high adverse human health or environmental effects of its activities on minority and low-income populations. There would be no disproportionate impacts on minority, low-income, or underserved populations from the implementation of proposed alternatives. Impacts would be applicable to proposed Alternative B and D.

No Action Alternative

Under the No Action Alternative, the MS TIG would not implement any projects for the WCNH and Birds Restoration Type at this time, and would instead allow natural recovery processes to occur (outcomes described in Section 3.2). Natural recovery would take much longer compared to a scenario in which restoration actions were undertaken. Land use trends in the vicinity of the project area do not indicate that the parcels are at high risk of development in the foreseeable future. If development were to occur, there would likely be an increase in property taxes paid to local governments. There would be no benefits from additional recreational visitor spending that could result from implementation of Alternatives B, C or D. The No Action Alternative does not meet the MS TIG's goals and objectives and does not provide the restoration benefit to WCNH and Birds that would occur through the proposed alternatives.

3.4.1.4.2 Tourism and Recreational Use

Affected Environment
The Grand Bay NWR Comprehensive Conservation Plan (USFWS 2008) provides an overview of tourism and recreational use on the NWR; information is incorporated here. The Grand Bay NWR receives about 700 visitors annually. Wildlife observation and photography, hunting (waterfowl, mourning doves, white-tailed deer, and feral hogs), and boating in tidal marshes are the managed recreational uses of Grand Bay NWR. All refuge roads open to the public are either paved or gravel. Bayou Heron Road and Pecan Road together are about 3 miles in length.

Hunting: Hunting for white-tailed deer, feral hogs, squirrel, geese, ducks, coots, and mourning doves on designated areas, subject to state regulations and conditions outlined by the refuge.

Ecotourism: Jackson County conducted the Pascagoula River Ecotourism Study in 2002–2003. The Gautier Economic Development Council formed an Ecotourism Planning Committee which published an "Ecotourism Master Plan" in 2004 (Gautier Economic Development Council 2004). This plan acknowledges Mississippi Sandhill Crane NWR as one of the premier local nature destinations that can attract tourists to the area for outdoor activities. Other local attractions are Shepard State Park (MDWFP), Pascagoula River Marsh (MDMR), Indian Point Campground and Recreational Vehicle Resort (privately owned), and Alf Dantzler Wildlife Preserve (MDMR).

Boating/Fishing: A public boat launch facility and bank fishing area is located at the end of Bayou Heron Road (USFWS 2004). A universally accessible fishing pier that is compliant with the Americans with Disabilities Act (ADA) is adjacent to the boat launch, along with a resurfaced ADA compliant gravel parking area. The refuge provides diverse habitats of salt marshes, bayous, grass beds, etc., for the region's important commercial and recreational species of fish. These habitats serve as nursery areas as well as breeding and feeding grounds for shrimp, red drum, speckled trout, blue crab, oysters, and crabs, among other marine and aquatic organisms.

Wildlife Observation and Photography: Grand Bay NWR provides limited opportunities for wildlife observation. Birding is one of the most popular forms of wildlife observation on the refuge, with viewing opportunities changing seasonally. Viewing opportunities include wintering flocks of wading birds and waterfowl in the bayou and bay, songbirds in the trees and shrubs, and harriers and hawks hunting over the savanna. Visitors may also see other common wildlife such as white-tailed deer, raccoon, snakes, and frogs.

Hiking: The Escatawpa Trail was developed in partnership with the Mississippi Interstate Welcome Center. The trail is a two-mile part boardwalk and part gravel trail. The trail features include universal access, and benches for resting and wildlife viewing opportunities. The trail provides wildlife observation and photography opportunities, particularly at the Escatawpa River overlook. There is also a picnic pavilion near the trail entrance on land adjacent to the refuge.

Environmental Consequences for WCNH and Birds Proposed Alternatives B, C and D-(Preferred)

Alternative B (Acquisition) would result in a long-term benefit to tourism and recreation opportunities by expanding the area's recreational activities including wildlife observation, hunting, boating, and hiking. Management activities such as chemical treatment, mechanical treatment, and prescribed fire would result in temporary access closure to parts of the proposed alternative project area but only during management activities. These would typically be done during the growing season and would be short in duration and would not preclude access from all parts of the NERR, NWR, or CP for most activities (Alternative B); short-term, minor, adverse impact to tourism and recreation would result. Proposed Alternative B and D would increase opportunities for recreation by increasing the area of publicly accessible lands resulting in a long-term benefit to tourism and recreation.

No Action Alternative

Under the No Action Alternative, the MS TIG would not implement any projects for the WCNH and Birds Restoration Type at this time, and would instead allow natural recovery processes to occur (outcomes described in Section 3.2). Natural recovery would take much longer compared to a scenario in which restoration actions were undertaken. Land use trends in the vicinity of the project area do not indicate that the parcels are at high risk of development in the foreseeable future. Under alternatives B and D, if development were to occur, there would likely be adverse impacts to tourism or recreation since development would likely limit access to these properties for recreational purposes. The No Action Alternative does not meet the MS TIG's goals and objectives and does not provide the restoration benefit to WCNH and Birds that would occur through the proposed alternatives.

3.4.1.4.3 Cultural Resources

Affected Environment

Cultural resources include historic properties listed in, or eligible for listing in the National Register of Historic Places (36 C.F.R. §60[a-d]). The National Historic Preservation Act of 1966 (NHPA), as amended and recodified (54 U.S.C. § 300308), defines an historic property as "any prehistoric or historic district, site, building, structure, or object included on, or eligible for inclusion on the National Register [of Historic Places]." Under the statute and implementing regulations, historic properties include significant traditional religious and cultural properties important to Indian tribes. Historic properties include built resources (bridges, buildings, piers, etc.), archaeological sites, and Traditional Cultural Properties, which are significant for their association with practices or beliefs of a living community that are both fundamental to that community's history and a piece of the community's cultural identity. Although often associated with Native American traditions, such properties also may be important for their significance to ethnic groups or communities. Historic properties also include submerged resources.

Many aboriginal earth and shell middens are located in the vicinity of Grand Bay NWR. The majority are multi-component earth and shell accumulations, products of hundreds of years of use as seasonal encampments and food processing sites. They are found principally along the remnant river levees of the historical Escatawpa River channel, now known as the Bayou Cumbest, Crooked Bayou, and Heron Bayou systems (USFWS 2008; MDMR 1998b).

By the late 1990s, at least six archaeological or cultural resource surveys had been conducted in the Grand Bay area, though most of these surveys did not contribute new knowledge about the region's past (MDMR 1998b). To date, the refuge has not been systematically surveyed for cultural and archaeological resources, but the presence of additional prehistoric and/or historic resources would be expected.

Environmental Consequences for WCNH and Birds Proposed Alternatives B, C and D-(Preferred)

The National Historic Preservation Act of 1966 (NHPA) charges the federal government with protecting the cultural heritage and resources of the nation. The selected alternative would be implemented in accordance with all applicable laws and regulations concerning the protection of cultural and historic resources. Cultural and historic resources would be considered when preparing site-specific restoration measures and management actions. Where disturbance of cultural resources is likely, resource managers would conduct reviews and/or surveys to inform the methods and location of restoration and management actions. For site-specific restoration measures and management actions, environmental compliance would be conducted by evaluating each restoration activity and management measure proposed for the parcel(s) against the environmental threshold criteria evaluated under this programmatic analysis. Restoration measures/management activities would be designed to avoid cultural resources to the extent practicable. Resource managers would work with the Mississippi State Historic Preservation Office and the DOI to determine compliance measures if resources are likely in the area or encountered during implementation.

No Action Alternative

Under the No Action Alternative, the MS TIG would not implement any projects for the WCNH and Birds Restoration Type at this time, and would instead allow natural recovery processes to occur (outcomes described in Section 3.2). Natural recovery would take much longer compared to a scenario in which restoration actions were undertaken. Land use trends in the vicinity of the project area do not indicate that the parcels are at high risk of development in the foreseeable future. Even if development were to occur, cultural resources would still be protected under the No Action Alternative. Still, development of the area could result in the adverse impacts to cultural resources. The No Action Alternative does not meet the MS TIG's goals and objectives and does not provide the restoration benefit to WCNH and Birds that would occur through the proposed alternatives.

3.4.1.4.4 Land and Marine Management

Affected Environment

The USFWS manages the Grand Bay NWR while the MDMR manages the Grand Bay NERR and Grand Bay Savanna CP. Management plans are summarized and incorporate by reference here.

<u>Grand Bay National Estuarine Research Reserve Final Environmental Impact Statement/Reserve Management Plan</u>: This EIS was finalized in 1998 by the Mississippi Department of Marine Resources. The purpose of this plan was to designate the area as part of the National Estuarine Research Reserve. For designation, a reserve management plan was produced and in 2013 was

updated. The Grand Bay NERR Management Plan 2013-2018 frames out stewardship, resource protection, public use/access, research and monitoring, education and coastal training plans.

Grand Bay National Wildlife Refuge Comprehensive Conservation Plan: This plan was finalized in 2008 by USFWS. The purpose of the plan was to guide management actions and direction over a period of 15 years. Specifically, the CCP was written to:

- Provide a clear statement of the refuge's management direction;
- Provide refuge neighbors, visitors, and government officials with an understanding of the USFWS's management actions on and around the refuge;
- Ensure that the USFWS's management actions, including land protection and recreation/education programs, are consistent with the mandates of the National Wildlife Refuge System; and
- Provide a basis for development of the refuge's budget requests for operations, maintenance, and capital improvement needs.

Land Protection Plan and Final Environmental Assessment for the Expansion of Grand Bay National Wildlife Refuge: This plan was finalized in 2012 by USFWS. This plan identified the proposed acquisition boundary for the proposed expansion of NWR. It delineated approximately 8,428 acres from four areas adjacent to the refuge for restoration, enhancement, and management. The purpose of the proposed refuge expansion was to conserve valuable riverine habitat, to protect threatened and endangered species, to restore and protect key habitats (i.e. coastal savanna and longleaf pine), and to manage populations of migratory birds and other interjurisdictional trust species.

Environmental Consequences for WCNH and Birds Proposed Alternatives B, C and D-(Preferred)

The acquisition of up to 8,000 acres (Alternative B), management of up to 17,500 acres (Alternative C) or the both (Alternative D-preferred), is consistent with the current plans for the NWR, Grand Bay NERR and the Grand Bay Savanna CP. Alternative B would provide a long term-benefit to land and marine management by expanding the current public ownership in the area by as much as 8,000 acres. Alternative C would provide a long-term benefit to land and marine management by provide habitat restoration benefits to up to 17,500 acres of currently owned or newly acquired lands within the complex. Alternative D-preferred would provide a long-term benefit to land and marine management by acquisition and management of up to 8,000 acres and/or habitat management on up to 17,500 acres. The planning processes have been included public involvement. There would be a long-term benefit to land and marine management as a result of implementing Alternative B, C or D-preferred.

No Action Alternative

Under the No Action Alternative, the MS TIG would not implement any projects for the WCNH and Birds Restoration Type at this time, and would instead allow natural recovery processes to occur (outcomes described in Section 3.2). Natural recovery would take much longer compared to a scenario in which restoration actions were undertaken. Land use trends in the vicinity of the project area do not indicate that the parcels are at high risk of development in the foreseeable future. However, under alternatives B and D, if development were to occur, there would likely be no effect on land and marine management because existing developments would be completed and would be consistent with existing land use plans. The No Action Alternative does not meet the MS TIG's goals and objectives and does not provide the restoration benefit to WCNH and Birds that would occur through the proposed alternatives.

3.4.1.4.5 Public Health and Safety

Affected Environment

Public roads in the proposed project alternative area are subject to flooding on the Grand Bay NERR. A large portion of the area is mapped as Zone VE. Zone VE is defined as Coastal flood zone with velocity hazard. This includes beach areas, open water and most estuarine marsh. Some estuarine marsh, streams, and riparian areas are mapped as Zone AE. Zone AE is defined as "Base Flood Elevations Determined". Upland areas are mostly Zone X. Zone X are defined as "Areas of 0.2% annual change flood; areas of 1% annual chance flood with average depths of less than 1 foot or with drainage areas less than 1 square mile; and areas protected by levees from 1% annual chance flood".

Environmental Consequences for WCNH and Birds Proposed Alternatives B, C and D-(Preferred)

There would be short-term, minor, adverse impacts to public health and safety. Exposure to smoke during prescribed fires would adversely impact public health, but these impacts are expected to be minor since prescribed fires are typical in this region and short term. Prescribed fire plans that include public notification of fires and controlled access into the site during fires would be developed to minimize the risk and potential exposure of the public to smoke. Fire breaks would restrict fire to designated areas and crews would be on site to ensure that fire does not jump the fire breaks. Safety plans would be part of the prescribed fire plans.

Chemical treatment would require use of herbicide that could be hazardous if spilled or handled improperly. Personnel applying chemicals would follow all warning labels on chemical containers and proper permits would be secured prior to treatment activities. Most of the applications would be in remote areas where there is limited public access.

The proposed alternative area is designated as floodplain. Preventing development in the floodplain/the transition of native habitats to new impervious surface provides a flood risk/public safety benefit. The proposed alternative would have a beneficial effect to the surrounding communities. It would promote healthy lifestyles by allowing recreational use on previously private parcels of land.

No Action Alternative

Under the No Action Alternative, the MS TIG would not implement any projects for the WCNH and Birds Restoration Type at this time, and would instead allow natural recovery processes to occur (outcomes described in Section 3.2). Natural recovery would take much longer compared to a scenario in which restoration actions were undertaken. Land use trends in the vicinity of the project area do not indicate that the parcels are at high risk of development in the foreseeable future. However, under alternatives B and D, if development were to occur, there would likely be no effect to public health and safety because local building codes and ordinances would be followed. The No Action Alternative would not have short-term, adverse impacts, to public safety from temporary exposure from prescribed fire associated with the implementation of proposed Alternative A. The No Action Alternative does not meet the MS TIG's goals and objectives and does not provide the restoration benefit to WCNH and Birds that would occur through the proposed alternatives.

3.4.2. Site-specific NEPA Review for WCNH and Birds Proposed Alternatives B, C & D-(Preferred)

Section 3.4.1 is a discussion of environmental consequences analysis of proposed Alternatives B, C and D for WCNH and Birds Restoration Type at a programmatic level. The exact parcels and associated restoration measures and management activities on those parcels are not known at this time. The environmental consequences are based on the range of restoration measures and management activities contemplated on parcels for proposed alternative project areas. The programmatic analysis provides maximum adverse impacts to each of the resource categories based on the MS TIG's knowledge of the proposed alternative project area and the anticipated impacts associated with the planned restoration measures and management activities. The MS TIG is proposing the selection of Alternative D (Preferred). Section 3.1.2 also presents a process that the MS TIG would follow to complete the requirements of NEPA and other environmental statutes as site-specific restoration measures and management activities are planned for Alternative D, if selected.

3.5 Cumulative Impacts for WCNH and Birds Alternatives

Section 6.6 and Appendix 6B of the PDARP/PEIS are incorporated by reference into the following cumulative impacts analysis including the methodologies for assessing cumulative impacts, identification of affected resources and the cumulative impacts scenario. A development of the analysis in the context of the affected environment of the proposed WCNH/Bird alternatives (X), when added to the impacts from applicable past, present and reasonably foreseeable future actions (Y), to understand the potential cumulative impacts to an affected resource (Z), or where the effects may interact and/or be additive, that is X + Y =Z. This analysis includes the alternatives proposed for the WCNH and Birds Restoration Type in this RP/EA, which include:

- Alternative A (Preferred): Graveline Bay Land Acquisition and Management
- Alternative B: Grand Bay Land Acquisition (up to 8,000 acres)
- Alternative C: Grand Bay Habitat Management (up to 17,500 acres)
- Alternative D (Preferred): Grand Bay Land Acquisition (up to 8,000 acres) and Habitat Management (up to 17,500 acres); Alternatives B and C combined
- No Action

3.5.1 Identification of Resources Affected

Sections 3.2 and 3.3 provide an environmental consequences analysis for the following resources that would have minor to negligible effects, and based on their magnitude, with respect to context and intensity, would not contribute to cumulative impacts. These resources are excluded from this cumulative impacts analysis:

- Noise;
- Marine and Estuarine Fauna;
- Infrastructure;
- Fisheries and Aquaculture;

- Marine Transportation; and
- Aesthetics and Visual Resources.

The following resources were analyzed in detail in Sections 3.2 and 3.3 for environmental consequences that could result from implementation of the proposed WCNH and Birds alternatives:

- Geology and Substrates;
- Hydrology and Water Quality;
- Air Quality and Greenhouse Gas Emissions;
- Habitats;
- Wildlife Species (including Birds);
- Protected Species;
- Socioeconomics and Environmental Justice;
- Cultural Resources;
- Tourism and Recreational Use; and
- Public Health and Safety.

Of the resources listed above, most were determined to have impacts that would not contribute to cumulative impacts, based on their magnitude with respect to context and intensity, and are therefore excluded from this cumulative impacts analysis. Only Air quality and greenhouse gas emissions and socioeconomics and environmental justice were carried forward for cumulative impacts analysis.

3.5.1.1 Cumulative Action Scenario

In order to effectively consider the potential cumulative impacts, the MS TIG identified local and site-specific past, current and reasonably foreseeable future actions which are considered relevant to identifying any cumulative impacts the alternatives may have on a local scale.

These actions fall within the established spatial and temporal boundaries. The cumulative impacts analysis depends on the availability of information and data about past, present and reasonably foreseeable future actions. For this RP/EA, the MS TIG identified present and potentially significant future actions through outreach to local, state and/or federal experts familiar with major environmental and development initiatives that have a potential to contribute significantly to cumulative impacts. Publicly available databases[53] and projects considered in previous restoration plans (Phase III FERP/PEIS, Phase IV ERP/EAs, and the PDAR/PEIS) were also reviewed to develop this list of actions. The MS TIG also relied on expert judgments, primarily qualitative, about the potential for impacts, using publicly available information about the likely design and location of

[53] http://blog.gulflive.com/mississippi-press-news/2014/06/mississippi_coastal_improvemen.html
http://www.nfwf.org/whoweare/mediacenter/pr/Pages/gulf-main-pr-14-1117.aspx
http://eli-ocean.org/gulf/restoration-projects-database/
https://restoration.atlas.noaa.gov/src/html/index.html
http://ms.restore

these actions. Table 3.5-1 provides a listing of actions that the MS TIG considered during this cumulative impacts analysis.

Table 3.5-1: Description of past, present, and reasonably foreseeable future actions considered in the cumulative impact analysis.

Category/Projects	Project Description	Key Resource Areas with Potential for Cumulative Impacts
Restoration Related to the *DWH* Oil Spill (Early Restoration Phases I, II & III, IV, Restore Act, Gulf Environmental Benefit Fund, North American Wetlands Conservation Fund, National Academy of Sciences)		
NFWF GEBF Invasive Species Management on Coastal State Land	The purpose of the Invasive Species Management on Coastal State Lands project is to remove and manage invasive species on state lands in coastal Mississippi in order to enhance natural ecosystem functioning of these systems and ensure a sustainable coastal environment. Work will include prescribed burning, mechanical and chemical control of invasive vegetation, and feral hog control. Assessment work is underway. The Mississippi Department of Marine Resources has procured a contractor to begin writing both an invasive species management plan and a prescribed fire management plan. Writing of the plans will take place throughout the fall of 2016.	Short-term, adverse impacts to: • air quality and greenhouse gases
RESTORE Act Strategic Land Protection, Conservation, and Enhancement of Priority Gulf Coast Landscapes – Bucket 2	This project will protect lands through acquisition and conservation easement programs in areas across the Mississippi Gulf Coast. Priority areas include the Grand Bay National Wildlife Refuge and others.	Long-term adverse impacts to: • socioeconomics Long-term benefits to: • socioeconomics • air quality and greenhouse gas emissions
NFWF GEBF Acquisition of Priority Tracts for Coastal Habitat Connectivity	This project seeks to enhance coastal habitat connectivity and increase core conservation areas within the Mississippi CP system, the Gulf Islands National Seashore, and the Grand Bay National Wildlife Refuge. The conservation of coastal habitats is one of the fundamental steps in building and maintaining a sustainable, resilient coastal environment. This project will address this conservation need by acquiring key land parcels that provide multiple long-term benefits for the Mississippi Gulf Coast ecosystem.	Long-term, adverse impacts to: • socioeconomics Long-term benefits to: • socioeconomics • air quality and greenhouse gas emissions
NFWF GEBF Habitat Restoration: Federal Lands Program – Phase I	This project will enhance and restore habitat on federal lands in coastal Mississippi. Anticipated outcomes for key focal habitats include restoration of over 30,000 acres through invasive species removal, forest thinning and prescribed burning on lands contained within Grand Bay National Wildlife Refuge and other locations.	Short-term, adverse impacts to: • air quality and greenhouse gases
Other relevant environmental stewardship and restoration activities		
MsCIP Project: Bayou Cumbest Ecosystem Restoration and Hurricane Storm Damage Reduction	The project, which is adjacent to Grand Bay CP, was funded in 2014. This project includes the acquisition of about 61 tracts, removal of 19 structures, excavation and removal of fill material from former home sites and adjacent lands, filling drainage ditches, control of non-native species and planting native emergent wetland species. After acquisition, 148 acres would be restored; 110 to emergent wetlands and 38 to coastal scrub shrub habitat.	Long-term adverse impacts to: • socioeconomics Long-term benefits to: • socioeconomics • air quality and greenhouse gas emissions
MsCIP Franklin Creek Ecosystem Restoration	This project was funded in 2014 and is located within the alternative project area. It would use ditch and roadbed removal, culvert installation under U.S. 90, non-native species control mechanisms and controlled burning to restore 149 acres north and south of the highway with critical wet pine savannah habitat. The work would also remove about 30 residential structures from the floodplain. The project is planned but not currently funded.	Short-term, adverse impacts to: • air quality and greenhouse gases

The following section describes the cumulative impacts of the alternatives being considered when combined with other past, present and reasonably foreseeable future actions which were identified above. In many situations, implementation of the alternatives would likely help reduce overall long-term adverse impacts by providing a certain level of offsetting benefits, especially when considered in concert with the numerous other present and reasonably foreseeable future actions in the area.

3.5.1.2 Cumulative impact Analysis

Air quality and greenhouse gas emissions
Implementation of the proposed WCNH and Birds alternatives (A, C and D) would have short-term, minor to moderate adverse impacts on air equality and greenhouse gas emissions due to smoke generated during prescribed fire that is anticipated for habitat management. As defined in the PDARP/PEIS, the impacts on air quality could be measurable and would be limited to local and adjacent areas. Emissions of criteria pollutants could be at EPA's de minimis criteria levels for general conformity determination under the Clean Air Act (40 CFR § 93.153). Prescribed fire activities would occur periodically according to site-specific management plans and burn plans, typically occurring every other year during the growing season. Limiting factors include wind, humidity, available personnel and other factors. Prescribed fire frequency would be intermittent and coordinated by resource managers so as not to occur simultaneously. The alternatives would not have cumulative long-term impacts on air quality or to emissions of greenhouse gases. Jackson County, Mississippi (as well as all other counties in Mississippi) is classified as in attainment, meaning criteria air pollutants do not exceed National Ambient Air Quality Standards (NAAQS). MDEQ monitors air quality at a station in Jackson County. Baldwin County, Alabama, is classified as unclassifiable/attainment.[54]

Periodic prescribed fire practices would not cause an adverse cumulative impact, because it is not anticipated that the levels of particulates and emissions created by prescribed fire would be sufficient for the project area to exceed attainment criteria established by the EPA.

Long term beneficial impacts to air and greenhouse gas emissions would also be anticipated due to re-vegetation and carbon sequestration that would occur during habitat management (Alternatives A, C, and D) and as a result of acquisition (Alternatives A, B and D) that would prevent development and provide for preservation in perpetuity.

Four projects are identified as potential contributors to cumulative impacts (four adverse and one beneficial) on air quality and greenhouse gas emissions when their impacts are combined with those of the alternatives: NFWF GEBF Invasive Species Management on Coastal State Land; NFWF GEBF Habitat Restoration: Federal Lands Program – Phase I, and MsCIP Franklin Creek Ecosystem Restoration, and industrial operations in the project area. Smoke from prescribed fire associated with these projects would result in short-term minor to moderate air quality impacts. However, three other

[54] https://www.regulations.gov/document?D=EPA-HQ-OAR-2012-0918-0426

projects considered in the cumulative impacts analysis (RESTORE Strategic Land Protection, Conservation, and Enhancement of Priority Gulf Coast Landscapes – Bucket 2, NFWF GEBF Acquisition of Priority Tracts for Coastal Habitat Connectivity, and MsCIP Project: Bayou Cumbest Ecosystem Restoration and Hurricane Storm Damage Reduction) would provide a long-term beneficial impact to air quality and greenhouse gas emissions by carbon sequestration preservation as a result of land acquisition, which would prevent development in perpetuity and prevent de-vegetation.

When the proposed WCNH and Birds Alternatives A-D are analyzed in combination with these past present, and reasonably foreseeable future actions, short-term cumulative adverse impacts to air quality and greenhouse gas emissions would likely occur. The alternatives would not contribute substantially to cumulative adverse impacts to air quality and greenhouse gas emissions. The alternatives, carried out in conjunction with other restoration efforts, would also have the potential to result in some long-term beneficial cumulative impacts to air quality.

Socioeconomics and Environmental Justice:
Land acquisition anticipated for Alternatives A, B and D could have a minor to moderate long-term impact on socioeconomic resources due properties being removed from the local tax base permanently. Individuals would not be adversely affected because any property transfers would be on an appraised value basis between willing parties. There could be long-term beneficial impacts due to increased visitor spending in the area as a result of increased recreational access to the project areas.

Three projects are identified as potential contributors to cumulative impacts (adverse and beneficial) on socioeconomics when their impacts are combined with those of the alternatives: RESTORE Strategic Land Protection, Conservation, and Enhancement of Priority Gulf Coast Landscapes – Bucket 2, NFWF GEBF Acquisition of Priority Tracts for Coastal Habitat Connectivity, and MsCIP Project: Bayou Cumbest Ecosystem Restoration and Hurricane Storm Damage Reduction. All of these projects involve voluntary land acquisition, which could permanently affect the local tax base, but could also provide a long-term beneficial impact by increasing visitor spending.

When the proposed WCNH and Birds alternatives (A, B and D) are analyzed in combination with these past, present, and reasonably foreseeable future actions, long-term cumulative adverse impacts to socioeconomics would likely occur. The alternatives would not contribute substantially to cumulative adverse impacts. The alternatives, carried out in conjunction with other restoration efforts, would also have the potential to result in some long-term beneficial cumulative impacts to socioeconomics.

3.6 Comparison of the Alternatives-WCNH and Birds Restoration Type

This section provides a comparison of the NEPA environmental consequences for the reasonable range of alternatives for the WCNH and Birds Restoration Type (Table 3.6-1). The proposed alternatives include four action alternatives as well as a No Action and are described in Table 3.6-1.

Table 3.6-1: Comparison of the WCNH and Birds Restoration Type Alternatives.

Alternatives	Comparison of WCNH and Birds Restoration Type Alternatives
Alternative A (Preferred):	Graveline Bay Land Acquisition and Management Project Alternative A would provide the opportunity to implement WCNH/Bird conservation practices as well contribute to the habitat connectivity of the area, and preclude development on 1,410 acres in Graveline Bay.
Alternative B:	Grand Bay Land Acquisition (up to 8,000 acres) Alternative B would include acquisition to reduce the threat of further development, decreased habitat fragmentation, and increased habitat connectivity to other large conservation parcels in Grand Bay NWR, NERR, and CP area.
Alternative C:	Grand Bay Habitat Management (up to 17,500 acres) Alternative C would include habitat management on current public lands within the NWR, NERR and CP boundaries. Restoration measures and benefits provide for more effective large-scale management efforts and habitat enhancement.
Alternative D (Preferred):	Grand Bay Land Acquisition (up to 8,000 acres) and Habitat Management Project (up to 17,500 acres) Alternative D would combine the benefits from Alternative B and C.
No Action Alternative:	Under the No Action Alternative, the MS TIG would not implement any projects for the WCNH and Birds Restoration Type at this time, and would instead allow natural recovery processes to occur, which could result in one of four outcomes for injured resources: 1) gradual recovery; 2) partial recovery; 3) no recovery; or 4) further deterioration. Although injured resources could presumably recover to or near baseline conditions under this scenario, recovery would take much longer compared to a scenario in which restoration actions were undertaken.
Physical Environment	
Alternative A (Preferred):	Based on the analysis impacts there would be short-term to long-term, minor to moderate and adverse impacts to soils. There would be short-term, minor to moderate, adverse impacts to hydrology, water quality, wetlands, and air quality and greenhouse gases. There would be long-term benefits to soil, hydrology, floodplains, and wetlands. There would be short-term and long-term benefits to water quality.
Alternative B:	There would be long-term, minor, adverse impacts to geology and substrates due to increased public use. There would be long-term benefits to hydrology, water quality, and wetlands by preventing development.
Alternative C:	There would be short-term, minor to moderate, adverse impacts to geology and substrates due to soil disturbance during habitat management-mechanical treatment, chemical treatment, prescribed fire. There would be short-term, minor to moderate, adverse impacts to hydrology, water quality, and wetlands due to temporary changes to stormwater flows and runoff retention patterns due to rutting by equipment and vegetation removal during habitat management activities. There would be short-term moderate adverse impacts to air quality and greenhouse gases during the prescribed fire events.
Alternative D (Preferred):	Alternative D would combine the adverse and beneficial impacts of Alternative B and C.
No Action Alternative:	This alternative is not expected to contribute to short-term or long term, or cumulative adverse impacts to physical resources. The No Action Alternative does not provide the restoration benefits to WCNH and Birds that would occur through the proposed alternatives.

Alternatives	Comparison of WCNH and Birds Restoration Type Alternatives
Biological Environment	
Alternative A (Preferred):	There would be short-term, minor to moderate, adverse impacts to habitat and wildlife. There would be short-term and long-term benefits to habitat and wildlife. The following federally protected species could be present within the proposed alternative project area: Alabama red-belly turtle, piping plover, red knot, black pine snake; gopher tortoise, Louisiana quillwort, Mississippi sandhill crane, and Mississippi diamondback terrapin (Mississippi diamondback terrapin is not federally protected, but is classified as state imperiled). Best practices outlined in the Best Practices Summary Table of the Section 7 consultation would be implemented to the extent practicable in order to avoid and minimize impacts to protected species. Migratory bird species groups that could occur in the proposed alternative project area include wading birds, shorebirds, seabirds, raptors, goatsuckers, waterfowl, doves and pigeons, and rails and coots. For all planned restoration activities, pre-commencement nesting surveys for migratory birds and raptors within the site-specific project area would be conducted and if evidence of nesting is found, coordination with the USFWS would be completed to develop and implement appropriate measures so that no “take” of nesting birds is anticipated.
Alternative B:	There would be long-term benefits to habitats and wildlife by preventing development.
Alternative C:	There would be short-term, minor to moderate, adverse impacts to habitat and wildlife due to site disturbance during restoration activities. The following federally protected species could be present within the proposed alternative project area: Alabama red-belly turtle, piping plover, red knot, Black pine snake; gopher tortoise, wood stork, Louisiana quillwort, Mississippi sandhill crane, red cockaded woodpecker, and Mississippi diamondback terrapin (Mississippi diamondback terrapin is not federally protected, but is classified as state imperiled). Best practices outlined in the Best Practices Summary Table would be implemented to the extent practicable in order to avoid and minimize impacts to protected species. Migratory bird species groups that could occur in the proposed alternative project area include wading birds, shorebirds, seabirds, raptors, goatsuckers, waterfowl, doves and pigeons, and rails and coots. For all planned restoration measures and management activities, pre-commencement nesting surveys for migratory birds and raptors within the site-specific project area would be conducted and if evidence of nesting is found, coordination with the USFWS would be completed to develop and implement appropriate measures so that no “take” of nesting birds is anticipated. There would be long-term benefits to habitats by implementing activities designed to enhance habitat.
Alternative D (Preferred):	Alternative D would combine the adverse and beneficial impacts of Alternative B and C.
No Action Alternative:	This alternative is not expected to contribute to short-term or long term, cumulative adverse impacts to biological resources. The No Action Alternative does not provide the restoration benefits to WCNH and Birds that would occur through the proposed alternatives.
Socioeconomic Environment	
Alternative A (Preferred):	Land acquisition could have a short-term, minor to moderate impact on socioeconomic resources due to changes in visitor spending and tax impacts. There would be short-term, minor adverse impacts to tourism and recreation during prescribed fires. There would be a long-term, minor to moderate, adverse effect to land and marine management as acquired properties would not be available for development. For site-specific restoration measures and management activities, environmental reviews and surveys would be conducted if cultural resources are suspected in the area. Resources that are eligible for the National Register of Historic Places would be avoided in the design of the restoration measures and management activities. There would be no adverse impact to cultural resources. There could be a minor short-term, adverse impacts to public health and safety. Exposure to smoke during prescribed fires would adversely impact public health, but these impacts are expected to be minor since prescribed fires are typical in this region and short term. The proposed alternative would have a beneficial effect to the surrounding communities. It would promote healthy lifestyles by allowing recreational use on previously private parcels of land.
Alternative B:	Land acquisition could have a minor to moderate impact on socioeconomic resources due to changes in

Alternatives	Comparison of WCNH and Birds Restoration Type Alternatives
	visitor spending and tax impacts. There would be long-term benefit to tourism and recreation opportunities by expanding the area recreational activities including wildlife observation, hunting, boating, and hiking. There would be long term-benefits to land and marine management by expanding the current public ownership. There would be a beneficial effect to the surrounding communities by promoting healthy lifestyles by allowing recreational use on previously private parcels of land and by preventing development in the floodplain, thereby reducing flood risk.
Alternative C:	Management activities could have short-term, minor impact to tourism and recreation. For site-specific restoration activities, environmental reviews and surveys would be conducted if cultural resources are suspected in the area. Resources that are eligible for the National Register of Historic Places would be avoided in the design of the restoration measures and management activities. There would be no adverse impact to cultural resources. There would be long-term benefit to land and marine management by habitat restoration benefits to up to 17,500 acres of currently owned lands. There would be minor, short-term adverse impacts to public health and safety. Exposure to smoke during prescribed fires would adversely impact public health. There would be a beneficial effect to the surrounding communities by promoting healthy lifestyles by allowing recreational use on previously private parcels of land and by preventing development in the floodplain, thereby reducing flood risk.
Alternative D (Preferred):	Alternative D would combine the adverse and beneficial impacts of Alternative B and C.
No Action Alternative	This alternative is not expected to contribute to short-term or long term, cumulative adverse impacts to socioeconomics. The No Action Alternative does not provide the restoration benefits to WCNH and Birds that would occur through the proposed alternatives.
Cumulative Effects	
Alternatives A (Preferred), B, C and D (D is Preferred)	There could be minor to moderate, long-term adverse impact to socioeconomic resources (A, B and D due to acquired properties being removed from local tax base and from development. There could be long-term beneficial impacts from increased visitor spending resulting from added recreational access (A-D). Carried out with other past, present, and reasonably foreseeable future actions, long-term cumulative adverse impacts to socioeconomics would not contribute substantially to cumulative adverse impacts to socioeconomic resources. There could be increased visitor use as a result of the acquisition and preservation of lands in perpetuity. Implementation of the proposed WCNH/Bird alternatives (A, C and D) would have short-term, minor to moderate adverse impacts on air equality and greenhouse gas emissions due to smoke generated during prescribed fire that is anticipated for habitat management. Long term beneficial impacts to air and greenhouse gas emissions would also be anticipated due to re-vegetation and carbon sequestration that would occur during habitat management (Alternatives A, C, and D) and as a result of acquisition (Alternatives A and D) that would prevent development and provide for preservation in perpetuity. When the proposed WCNH and Birds Alternatives A-D are analyzed in combination with these past present, and reasonably foreseeable future actions, implementation of the alternatives would not contribute substantially to cumulative adverse impacts to air quality and greenhouse gas emissions. The alternatives, carried out in conjunction with other restoration efforts, would also have the potential to result in some long-term beneficial cumulative impacts to air quality.
No Action Alternative	There would be no beneficial impacts or short or long-term cumulative adverse impacts to resources.

The MS TIG is proposing to select Alternative A (Preferred): Graveline Bay Land Acquisition and Management and Alternative D (Preferred): Grand Bay Land Acquisition and Habitat Management. Table 3.6.27 above summarizes the environmental consequences for the proposed alternatives in the RP/EA. Subsequent environmental review would occur in addition to this programmatic review to determine whether planned site-specific restoration activities and management measures are within the maximum expected impacts described in this RP/EA. As described in Section 3.1.2, an

Environmental Evaluation Worksheet (Appendix A) would be used to determine whether the planned site-specific restoration measures and management activities are at or below the maximum adverse impacts described in this RP/EA. If they are not, the MS TIG would undertake additional environmental review consistent with NEPA requirements and other requirements for protection of the environment or would consider other options regarding the planned project. The MS TIG does not propose to take actions that would result in any significant adverse impacts on the environment.

The MS TIG would consider best practices referenced in Section 6.15 and Appendix 6A of the PDARP/PEIS. Additional best practices may be recommended for site-specific restoration measures and management activities in different locations due to differences in relevant conditions.

3.7 NR (Nonpoint Source) Restoration Type

Section 3.7.1 provides the OPA evaluation for the Nutrient Reduction (NR) Alternatives A and B. If the proposed preferred Alternative (A) is selected, the USDA will be the lead Implementing Trustee for the project working with other Trustees and with NRCS as a project partner. MDEQ and EPA will assist in monitoring the project.[55] The implementation of conservation practices under these alternatives would be dependent on willing landowners and successful conservation planning to implement those actions. Section 3.7.2 describes the programmatic approach to this NEPA analysis and for NEPA review after site-specific conservation practices have been identified. In addition to incorporating by reference the analysis the USDA-NRCS has conducted on the effects of its conservation practices, the discussion in this RP/EA includes examples of the conservation practices the MS TIG expects would be implemented in the proposed project area and how those practices are expected to impact the environment. Appendix B includes the full list of conservation practices that would be eligible for funding under the alternatives.

3.7.1 OPA Evaluation for NR (Nonpoint Source)

The Nutrient Reduction proposed project alternatives are consistent with the Restore Water Quality Programmatic Goal and the NR Restoration Type in the PDARP/PEIS. Table 3.7-1 provides an OPA evaluation of each NR alternative using the standard OPA evaluation criteria described in OPA implementing regulations at 15 CFR 990.54. These OPA evaluation criteria are listed below:

- The cost to carry out the alternative (The Cost).
- 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 (Restoration Goals and Objectives).
- The likelihood of success of each alternative (Likelihood of Success).

[55] Specific roles and responsibilities will be determined in accordance with Trustee Council Standard Operating Procedures for Implementation of the Natural Resource Restoration for the *Deepwater Horizon* (DWH) Oil Spill

- The extent to which each alternative will prevent future injury as a result of the incident and avoid collateral injury as a result of implementing the alternative (Avoidance of Further Injury/Collateral Injury).
- The extent to which each alternative benefits more than one natural resource and/or service (Multiple Resource Benefits).
- The effect of each alternative on public health and safety (Public Health and Safety).

Table 3.7-1: NR (Nonpoint Source) -OPA Evaluation of Alternatives.

Alternative	OPA Evaluation Criteria
Cost	
Alternative A: Upper Pascagoula River Water Quality Enhancement (Project)	Alternative A: The cost of $4.0 M for development and implementation of conservation plans and practices in the Chunky-Okatibbee watersheds is reasonable for the proposed alternative. USDA-NRCS would implement this proposed alternative by helping landowners voluntarily implement conservation practices that reduce nutrient and sediment runoff. Through their experience with the Environmental Quality Incentives Program (EQIP), USDA- NRCS is knowledgeable about the cost of successful implementation of the proposed conservation practices. For Alternative A, there would be an opportunity to implement Ecological/NR conservation practices and soil and water/NR conservation practices with willing participants, allowing for a wide array of benefits to cropland, pasture/grassland, forestland, associated agriculture lands, and riparian areas. This alternative would be more cost-effective as it incorporates soil and water conservation practices on agricultural land, near the source of nutrient and sediment runoff. Addressing nutrient and sediment runoff near the source coupled with conservation practices that improve the filtering ability of riparian areas would be more efficient and effective at nutrient reduction than restricting practices only to riparian areas. The MIS TIG anticipates that the proposed alternative would result in improved water quality by reducing nutrient and sediment runoff into coastal waters.

Alternative	OPA Evaluation Criteria
Alternative B: Pascagoula River Basin Riparian Buffer Maintenance Plan	Alternative B: The cost of $4.0 M for the enhancement or establishment of riparian buffers in the Chunky-Okatibbee watersheds is reasonable for the proposed project. USDA-NRCS would implement this project by helping landowners voluntarily implement practices that reduce nutrient and sediment runoff by implementing Ecological/NR conservation practices in riparian areas in the proposed project area in the Chunky-Okatibbee watersheds. Through their experience with EQIP, USDA-NRCS is knowledgeable about the cost of successful implementation of the proposed conservations practices. For Alternative B, there would be an opportunity to implement Ecological/NR conservation practices with willing participants, allowing for a wide array of benefits to riparian areas[56] within forestland and associated agriculture lands on farmsteads. The MIS TIG anticipates that the project would result in improved water quality by reducing nutrient and sediment runoff into coastal waters.
Restoration Goals and Objectives	
Alternative A: Upper Pascagoula River Water Quality Enhancement (Project)	Alternative A has a clear nexus to the NR injuries described in the PDARP/PEIS because implementation of conservation practices on privately owned lands would reduce nutrient enrichment and sedimentation and restore water quality in Gulf of Mexico coastal watersheds. The health of the Gulf of Mexico depends upon the health of its estuaries, and the health of those coastal waters is influenced by land use upstream along tributary rivers. The primary goal for this proposed alternative is water quality improvement through the NR Restoration Type. This watershed-scale proposed alternative restores water quality impacted by the *DWH* Oil Spill by reducing the levels of nutrients and sediments entering the Gulf of Mexico. Runoff from cropland, pasture/grassland, and forestland contributes nutrients and sediment that adversely impact the health of coastal waters. 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 would provide benefits to marine resources and coastal watersheds. Further, Alternative A is consistent with existing MS TIG goals and objectives that focus on opportunities for leveraged funding, Trustee expertise from state and federal programs and resource management expertise, and projects that are consistent with existing management plans and initiatives. This alternative meets these goals by utilizing Ecological/NR and soil and water conservation/NR practices. It includes an additional $1.0 M of leveraged funding from USDA-NRCS for developing conservation plans and implementing conservation practices in the proposed alternative project area. This alternative also utilizes expertise from USDA-NRCS, and is consistent with the

[56] In general the efficiency of nutrient and sediment removal would depend on the width of riparian buffers, types of plant materials used and storm events.

Alternative	OPA Evaluation Criteria
	PDARP/PEIS and the MGCRP.
Alternative B: Pascagoula River Basin Riparian Buffer Maintenance Plan	Alternative B has a clear nexus to the NR injuries described in the PDARP/PEIS because implementation of conservation practices on privately owned lands would reduce nutrient enrichment and sedimentation and restore water quality in Gulf of Mexico coastal watersheds. The health of the Gulf of Mexico depends upon the health of its estuaries, and the health of those coastal waters is influenced by land use upstream along tributaries and rivers. The primary goal for this proposed alternative is water quality improvement through the NR (Nonpoint Source) Restoration Type by establishing or enhancing riparian buffers within the project area. This watershed-scale proposed alternative restores water quality impacted by the *DWH* Oil Spill by reducing the levels of nutrients and sediments entering the Gulf of Mexico by applying conservation practices in riparian areas. Conservation practices in the riparian area can treat runoff from cropland, pasture/grassland, and forestland that contributes nutrients and sediment that adversely impact the health of coastal waters. 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 marine resources and coastal watersheds. Alternative B would focus on riparian areas within agricultural associated land and forested land in the proposed alternative project area. This alternative would seek to identify opportunities to implement Ecological/NR conservation practices in riparian buffers along the Pascagoula River and its tributaries in the proposed alternative project area. Conservation practice opportunities within one mile of tributaries that already have riparian buffers and areas where new riparian buffers could be successfully established would be a priority. Riparian buffers act to partially protect streams from the impact of adjacent land uses. Buffers would increase water quality in associated streams as sediment is intercepted, provide habitat, and reduce bank erosion by providing bank stabilization. With planning and monitoring, riparian buffers and other related conservation practices would help control channel instability, head-cutting, mass slumping, and wetland degradation. Riparian buffers that exist currently and proper planning of new buffers would help mitigate future water quality degradation. Further, Alternative B is consistent with existing MS TIG goals and objectives that focus on opportunities for leveraged funding, Trustee expertise from state and federal programs and resource management expertise, and projects that are consistent with existing management plans and initiatives. This alternative meets these goals by utilizing Ecological/NR conservation practices. It includes an additional $1.0 M of leveraged funding from USDA-NRCS for establishing or enhancing riparian areas within the proposed alternative project area. This alternative also utilizes expertise from USDA-NRCS, and is consistent with the PDARP/PEIS and the MGCRP.
Likelihood of Success	

Alternative	OPA Evaluation Criteria
Alternative A: Upper Pascagoula River Water Quality Enhancement Project; **Alternative B: Pascagoula River Basin Riparian Buffer Maintenance Plan**	Alternatives A & B: The USDA-NRCS, has demonstrated success in developing and implementing the same types of conservation practices in the proposed alternative project area and other similar watersheds. Given their extensive experience and expertise in conservation practices, the success and legacy of the USDA-NRCS Farm Bill programs, and their established level of trust and cooperation with private landowners, 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.
Avoidance of Further Injury/Collateral Injury	
Alternative A: Upper Pascagoula River Water Quality Enhancement Project; **Alternative B: Pascagoula River Basin Riparian Buffer Maintenance Plan**	Alternatives A & B: The USDA-NRCS, has applied conservation practices 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 under either Alternative A or B. In addition, the MS TIG would ensure compliance with all applicable federal laws, regulations and executive orders prior to implementation of the selected alternative by using a site-specific environmental evaluation process carried out during the conservation planning effort. This process would include conducting any necessary agency consultations and obtaining any required permits. Among other things, the environmental evaluation would identify mitigation measures needed and determine whether there is potential for significant adverse effects to be created. If such potential exists, that particular project would be abandoned or redesigned to minimize the impacts. The MS TIG does not anticipate implementing any actions with potential for significant adverse effects. The proposed alternative would meet all the OPA and NEPA requirements as discussed in Sections 3.0 and 4.0 of this RP/EA. In addition to addressing unique resources site-specifically, the MS TIG has also completed a programmatic consultation under ESA and the U.S. Fish and Wildlife Service has concurred that by following identified conservation measures the conservation practices implemented under the proposed action alternative may affect but are not likely to adversely affect protected species in the project area.
Multiple Resource Benefits	
Alternative A: Upper Pascagoula River Water Quality Enhancement Project; **Alternative B: Pascagoula River Basin Riparian Buffer Maintenance Plan**	Under both proposed Alternatives A and B, various conservation practices would be conducted on private lands to address nutrient reduction. Through a coordinated and integrated watershed approach to proposed alternative implementation, benefits to multiple resources are anticipated from reductions in nutrient and sediment losses from the landscape and the resulting reductions in nutrient and sediment loads to streams and downstream receiving waters that would provide benefits to marine resources and coastal watersheds. For example, either alternative would reduce nutrient and sediment loads in watersheds that contain Gulf sturgeon Critical Habitat. The Gulf sturgeon is anadromous, spending much of its life in marine environments, but spawning occurs in the Upper Pascagoula River and tributaries and in other river systems in the Gulf. Decreasing sediment and other pollutants as proposed under these alternatives may improve Gulf sturgeon spawning success.

Project Alternatives A and B would meet the evaluation criteria established by OPA because:

- Cost estimates are based on comparable projects previously implemented and those costs were considered reasonable;
- The project alternatives have a clear nexus to the NR injuries described in the PDARP/PEIS, and the MS TIG's restoration goals and objectives that would be met include opportunities for leveraged funding, Trustee expertise from state and federal programs and partnering agency resource management expertise, and consistency with existing management plans and initiatives;
- There is a high likelihood of success because these alternatives propose implementing proven conservation practices and tested restoration techniques used by the MS TIG Trustees and project partners on similar types of projects in the region;
- These watershed-scale proposed alternatives improve the quality of coastal waters impacted by the *DWH* Oil Spill by reducing the runoff of nutrients, and sediment into coastal waters;
- Future and collateral injury would be avoided by employing best practices during project implementation;
- Both alternatives are likely to benefit more than one resource; and
- There would be a long-term benefit to public safety from improved water quality.

Proposed Alternatives A and B are also consistent with the MGCRP and other regional planning initiatives. The nexus between these alternatives and the injury and the programmatic restoration goal is clear because implementation of conservation practices on privately owned lands would reduce nutrient enrichment and sedimentation and restore water quality in Gulf of Mexico coastal watersheds. Future conservation planning and implementation of USDA-NRCS conservation practices would not require additional OPA evaluation.

3.7.2 NEPA Analytical Approach for NR (Nonpoint Source) Restoration Type

This section provides the NEPA analytical approach for the NR (Nonpoint Source) Restoration Type in the following order:

1. USDA NEPA Analyses for conservation practices incorporated by reference;
2. A description of the general NEPA analytical approach for the NR (Nonpoint Source) project alternatives;
3. The MS TIG plan for site-specific NEPA review for the selected alternative; and
4. The organization of the affected environment and environmental consequences for the proposed alternatives under the NR (Nonpoint Source) Restoration Type.

1) USDA NEPA Analyses for Conservation Practices Incorporated by Reference: The USDA-NRCS has a long-standing structured, interdisciplinary, science-based, and public process for developing conservation practice standards and analyzing the effects of those practices.[57] Implementing these conservation practices has been proven to successfully address natural resource concerns related to agricultural and forested lands, and many of these practices can be used to achieve a number of the Restoration Types identified in the *DWH* PDARP/PEIS. Because of this, both of the proposed action alternatives contemplate using USDA-NRCS conservation practices to achieve certain PDARP/PEIS restoration goals in Mississippi. This analysis hereby incorporates by reference the standards and specifications for the conservation practices in Appendix B found in the USDA-NRCS National Handbook of Conservation Practices and the analysis of the effects of those practices contained in the USDA-NRCS Conservation Practice Physical Effects (CPPE) matrices, the Network Effects Diagrams,[58] and in the USDA-NRCS Conservation Effects Assessment Project reports.[59] Each of those assessments is based on a review of the best available scientific studies and methodological approaches, as well as professional judgment.[60] In addition, this document incorporates by reference the analyses from the USDA-NRCS EQIP Programmatic EA, March 2016, and in particular its discussions of the water quality impacts of NRCS conservation practices.

2) The NEPA Analytical Approach for the Development of NR (Nonpoint Source) Project Alternatives: This RP/EA analyzes potential environmental impacts at a broad program scale, identifying the qualitative effects that are a reasonably foreseeable result of each alternative. Under both action alternatives there would be a landowner outreach and a conservation planning phase in which USDA-NRCS would work with private landowners to develop site-specific conservation plans outlining a combination of conservation practices.[61] Conservation planning for proposed Alternative A (Preferred) would be conducted for the purpose of achieving nutrient and sediment reduction from agricultural and forested land, including riparian areas, whereas conservation planning for Alternative B would focus on establishing and maintaining riparian buffers that effectively filter nutrients and sediment from upland runoff, and would not address nutrient and sediment runoff at the source. Conservation practices would be planned and implemented on a site-specific basis, and would vary depending on the physical conditions, characteristics, and environmental constraints (e.g. endangered

[57] See, for example, the Environmental Quality Incentives Program Programmatic EA, March 2016 at https://www.nrcs.usda.gov/wps/portal/nrcs/detail/national/technical/ecosciences/ec/?cid=nrcseprd387616 and research associated with the NRCS Conservation Effects Assessment Project at https://www.nrcs.usda.gov/wps/portal/nrcs/main/national/technical/nra/ceap/ . See also the national NRCS conservation practice standards and associated CPPE and Network Effects Diagrams at https://www.nrcs.usda.gov/wps/portal/nrcs/detailfull/national/technical/cp/ncps/ ?cid=nrcs143_026849.

[58] Both the CPPE matrices and network effects diagrams are available from the NRCS National Handbook of Conservation Practices web site at https://www.nrcs.usda.gov/wps/portal/nrcs/detailfull/national/technical/cp/ncps/

[59] https://www.nrcs.usda.gov/wps/portal/nrcs/main/national/technical/nra/ceap/.

[60] The majority of conservation practices likely to be implemented under the proposed action have been determined to fall within established NRCS categorical exclusions and therefore would not normally require preparation of an EA or EIS if implemented under NRCS program authorities. However, because this action is proposed for funding under the *DWH* NRDA Consent Decree and not all *DWH* NRDA Trustees have such categorical exclusions, the MS TIG decided to prepare this EA to aid their planning, decision-making and compliance with NEPA.

[61] The landowner outreach program, conservation planning activities and creation of conservation plans would not require project-specific environmental compliance measures described in this section.

species, cultural resources, etc.) associated with each site. Because the specific sites are not yet known, this analysis identifies the environmental impacts that normally occur from implementing USDA-NRCS conservation practices to achieve nutrient and sediment reductions. In addition to incorporating by reference the analysis USDA-NRCS has conducted on the effects of its conservation practices, the discussion in this RP/EA includes examples of the conservation practices the MS TIG expects would be implemented in the project area for the proposed alternatives and how those practices are expected to impact the environment.

3) The MS TIG Approach to Site-Specific Environmental Review for the Selected Alternative: Subsequent environmental review would occur in addition to this NEPA analytical approach to determine whether a planned site-specific action is below the maximum adverse impacts described in this RP/EA. An example of the Environmental Evaluation Worksheet used to document this review is attached as Appendix A. If the site-specific action is below the maximum adverse impacts described in this RP/EA, the analysis of the effects would be documented on the Environmental Evaluation Worksheet and the action would proceed. The Environmental Evaluation Worksheet would be routed through the MS TIG to the administrative record, where it would be publicly available.[62] If the evaluation of the planned site-specific action indicates effects are likely to exceed the maximum adverse impacts described in this EA, the MS TIG would undertake additional site-specific environmental review consistent with NEPA requirements and other requirements for protection of the environment. The MS TIG does not propose to take actions that would result in any significant adverse impacts on the environment.

4) Organization of the Affected Environment and Environmental Consequences for NR (Nonpoint Source) Restoration Type: Guidelines for NEPA impact determinations for the PDARP/PEIS are described in Section 6.3.2 of the PDARP/PEIS and are hereby incorporated by reference. NR Alternatives A and B include development and implementation of conservation plans to reduce nutrient and sediment runoff, which would improve water quality in downstream coastal waters. Alternative A (Preferred) would include conservation practices on agricultural and forested land including riparian areas; Alternative B would include practices such as conservation buffers only in riparian areas associated with agricultural and forested land. Section 3.8 below addresses the environmental consequences of the No Action Alternative, which would allow natural recovery to proceed, followed by an overview of the proposed NR (Nonpoint Source) alternatives in Section 3.9. The NEPA affected environment and environmental consequences for the NR (Nonpoint Source) Restoration Type alternatives are structured as follows:

- Section 3.9 NR (Nonpoint Source) Alternatives - Description of Common Features and Analytical Approach
- Section 3.9.1 NR (Nonpoint Source) Alternatives A and B - Affected Environment and Environmental Consequences
- Section 3.9.1.1 Overview of Affected Environment and Environmental Consequences

[62] Information that cannot be released will be redacted in accordance with Privacy Act, Freedom of Information Act, and other applicable requirements.

- Section 3.9.1.2 Physical Environment
- Section 3.9.1.3 Biological Environment
- Section 3.9.1.4 Socioeconomic Environment
- Section 3.10 Cumulative Impacts for NR (Nonpoint Source)
- Section 3.11 Comparison of the Alternatives-NR (Nonpoint Source) Restoration Type

3.8 No Action Alternative

In addition to the proposed alternatives listed above for the NR (Nonpoint Source) Restoration Type, the MS TIG evaluated the No Action Alternative (No Action). CEQ Regulations Implementing NEPA (§1502.14(d)) requires consideration of a No Action Alternative as a basis for comparison with potential environmental consequences of the action alternatives.

Under the No Action Alternative, the MS TIG would not implement any projects for the NR (Nonpoint Source) Restoration Type at this time, and would instead allow natural recovery processes to occur, which could result in one of four outcomes for injured resources: 1) gradual recovery; 2) partial recovery; 3) no recovery; or 4) further deterioration. Although injured resources could presumably recover to or near baseline conditions under this scenario, recovery would take much longer compared to a scenario in which restoration actions were undertaken.

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 Chapters 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. Under the No Action Alternative, some NR (Nonpoint Source) benefits could result from USDA-NRCS programs in the proposed project area, but not from the federal action being evaluated in this RP/EA. 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 would occur through the action alternatives.

When analyzed in combination with other past, present and reasonably foreseeable future actions, the No Action Alternative would provide no beneficial impacts, because existing conditions would not change in a predictable way. This alternative is not expected to contribute to short-term or long term, cumulative adverse impacts to physical resources, biological resources, or socioeconomics.

3.9 NR (Nonpoint Source) Alternatives -Description of Common Features and Analytical Approach

Both proposed NR (Nonpoint Source) alternatives would be implemented by USDA-NRCS in the Chunky-Okatibbee watershed in Mississippi for the purpose of improving water quality by implementing conservation practices to reduce nutrient and sediment runoff. USDA-NRCS and its conservation partners would help voluntarily participating landowners by developing conservation plans that identify natural resource concerns and conservation practices the landowner can implement to reduce nutrient and sediment runoff. The MS TIG proposes providing $4.0 M for either of these proposed alternatives. USDA-NRCS would invest an additional $1.0 M in program funds in the proposed alternative project area to implement similar conservation practices through EQIP. For both proposed Alternatives A and B, conservation planning would be completed with landowners in a 20,000-acre screening area shown in Figure 3.9-1.

Both alternatives would be implemented over a 5-year period with the first year consisting primarily of landowner outreach and planning. Implementation of the Ecological/NR and Soil and Water Conservation/NR conservation practices would begin in year two and continue through year five. The estimated cost for each of the alternatives is $4.0 M. USDA would be the lead Implementing Trustee for the project working with other Trustees and with NRCS as a project partner. MDEQ and EPA will assist in monitoring the project. USDA will also be the lead federal agency for conducting the environmental evaluation review for implementation.

The proposed NR (Nonpoint Source) alternatives would be implemented in portions of Newton, Lauderdale, Clarke, Neshoba, and Kemper counties, Mississippi. Lauderdale and Kemper counties contain the largest percentage of the project area. The project boundary is the Chunky-Okatibbee watershed boundary. That portion of the watershed upstream of the Okatibbee Lake Reservoir in northwestern Lauderdale County is not a part of the project area. The project location for the proposed alternatives would include conservation plans in a 20,000-acre area within the Chunky-Okatibbee watershed as shown on Figure 3.9-1.

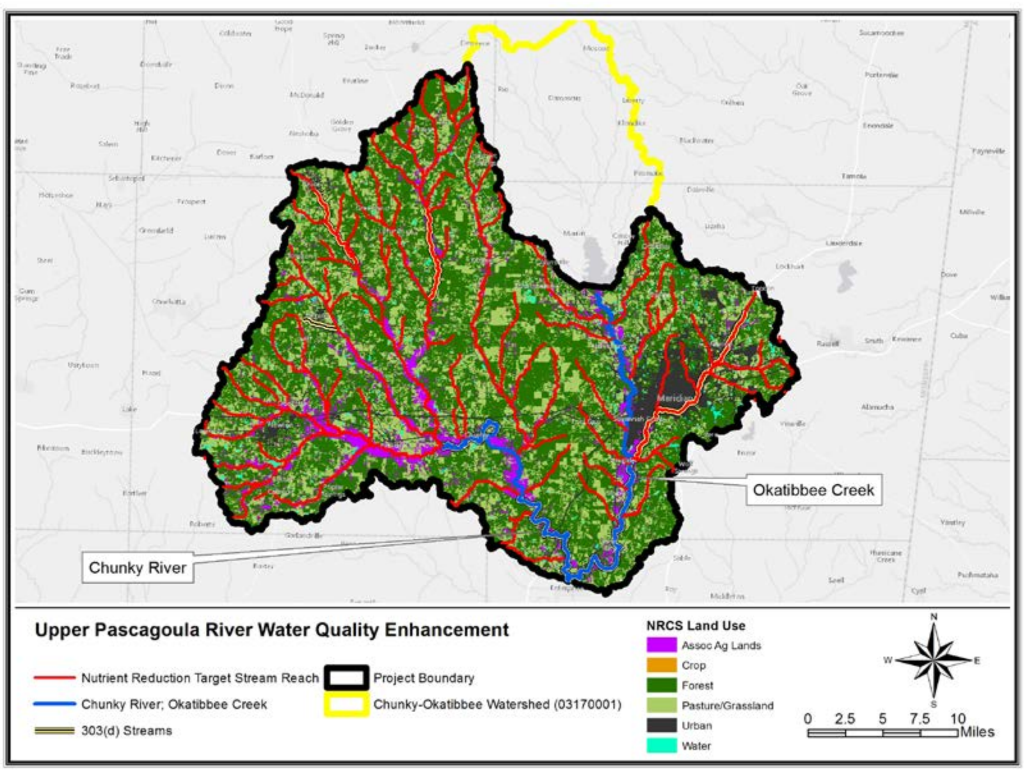


Figure 3.9-1: Upper Pascagoula River Water Quality Enhancement Project Area.

The primary goal for the NR (Nonpoint Source) alternatives is water quality improvement through nutrient and sediment reduction. The health of the Gulf of Mexico depends upon the health of its estuaries, and the health of those coastal waters is influenced by land uses in the watersheds of its tributaries. In the five Gulf States, over 80 percent of the acreage is in private ownership (USDA-NRCS 2014) and is used for forestry and agriculture. These watershed-scale NR (Nonpoint Source) alternatives restore water quality impacted by the *DWH* Oil Spill by reducing excessive nutrients and the sediment carrying them into coastal waters. Runoff from cropland, pasture/grassland, and forests contributes excess nutrients and sediment that adversely impact the health of coastal waters of the Gulf. While agricultural and forested lands are not the sole contributors (and in many instances, not the leading contributors) of nutrients to coastal waters, there are opportunities to address this resource concern at these sources in the Pascagoula watershed. Given the success of USDA-NRCS Farm Bill programs such as EQIP and their strong acceptance by private landowners, there is a significant opportunity to implement conservation practices on private lands that would reduce the levels of nutrients and sediments entering the Gulf of Mexico from the Pascagoula watershed.

Land Use

The following Land Use categories are located in the Chunky-Okatibbee watershed:

- ***Cropland* –** Land used primarily for the production and harvest of annual or perennial field, forage, food, fiber, horticultural, orchards, vineyards and/or energy crops (e.g.).
- ***Associated Agriculture Lands* –** Land associated with farms and ranches that are not purposefully managed for food, forage or fiber and are typically associated with nearby production and/or conservation lands. This could include incidental areas such as idle center pivot corners, odd areas, ditches and watercourses, riparian areas, field edges, seasonal and permanent wetlands, and other similar areas.
- ***Pasture/Grassland***
  - Pasture – Lands composed of introduced or domesticated native forage species that are used primarily for the production of livestock. They receive periodic renovation and/or cultural treatments, such as tillage, fertilization, mowing, weed control, and may be irrigated. They are not in rotation with crops.
  - Grassland **–** Land used primarily for the production of grazing animals. Includes native plant communities and those seeded to native or introduced species, or naturalized by introduced species, that are ecologically managed using range management principles.
- ***Forestland* –** Land on which the primary vegetation is tree cover (climax, natural or introduced plant community) and use is primarily for production of wood products and/or non-timber forest products.
- ***Developed Land (Urban)* –** Land occupied by buildings and related facilities used for residences, commercial sites, public highways, airports, and open space associated with towns and cities.
- ***Water* –** Geographic area whose dominant characteristic is open water/permanent ice or snow. May include intermingled land, including tidal influenced coastal marsh lands.

Table 3.9-1 lists the acreages of the Land Use categories located in the Chunky-Okatibbee watershed:

Table 3.9-1: Land Use Category Acreage.

National Resource Inventory[63] Land Use in the Chunky-Okatibbee Watershed	Acres
Associated Agriculture Lands	40,322
Cropland	3,580
Forestland	248,874
Pasture/Grassland	135,078
Developed Land (Urban)	45,689
Water	6,263
Total	479,806

Conservation Practices and Analytical Approach

Conservation Practices[64] are technical methods designed to help conserve soil, water, air, energy, and related plant and animal resources. Appendix B provides a complete list of conservation practices that will be available for implementation under proposed NR (Nonpoint Source) Alternatives A and B. Site-specific planning would be conducted to determine which particular practice is appropriate to use given the conditions at that site.

Certain conservation practices are highlighted for the purposes of this RP/EA, to provide examples of the types of effects that may result from the application of different types of conservation practices with a focus on ground-disturbing practices that have potential for adverse impacts. These practices have been grouped into two categories which are discussed below: 1-Conservation practices that provide Ecological and NR benefits (Ecological/NR conservation practices); and 2) Conservation practices that provide soil and water conservation and NR benefits (soil and water conservation/NR conservation practices). Some conservation practices, such as Conservation Practice Standard (CPS) 342, Critical Area Planting, can fall into both categories depending on the purpose for which the practice is used.

Table 3.9-2 provides a limited number of examples of conservation practices that provide Ecological/NR Benefits. These practices would apply to both Alternatives A and B. Table 3.9-3 provides a limited number of soil and water conservation/NR Benefits which would apply primarily to Alternative A. The conservation practice standards and their associated purposes and effects analysis, which have been incorporated by reference into this RP/EA, are available on the USDA-NRCS National Handbook of Conservation Practices web site at https://www.nrcs.usda.gov/wps/portal/nrcs/detailfull/national/technical/cp/ncps/?cid=nrcs143_026849.

[63] https://www.nrcs.usda.gov/wps/portal/nrcs/rca/national/technical/nra/rca/ida/
[64] https://www.nrcs.usda.gov/wps/portal/nrcs/detailfull/national/technical/cp/ncps/?cid=nrcs143_026849

Ecological/NR Conservation Practices: Examples of conservation practices that support Ecological/NR benefits (Table 3.9-2) include conservation practices implemented primarily on lands associated with agricultural operations, such as streams, riparian areas and forested lands, because these lands also can help to improve water quality by nutrient reduction through removal of sediment, nitrogen, and phosphorous. Eight conservation practices that include vegetative management, restoration of streambanks and shorelines, and structural measures to accomplish work in streams, wetlands and riparian areas are highlighted in this RP/EA as examples of conservation practices likely to be implemented under the proposed alternatives that also have potential for adverse impacts. Streambank and Shoreline Protection (CPS 580), Grade Stabilization Structures (CPS 410) and Forest Stand Improvement (CPS 666)[65] are discussed further in Section 3.9.1. Critical Area Planting (CPS 342) is considered to be both an Ecological/NR and Soil and Water Conservation/NR conservation practice. Any of a number of the conservation practices in Appendix B could be implemented under either of the proposed NR (Nonpoint Source) alternatives; the conservation practices funded would not be limited to those discussed here and the actual practices selected for each project site and their anticipated impacts would be documented on the Environmental Evaluation Worksheet in Appendix A and described in Section 3.7.2.

Table 3.9-2: Exemplar -Ecological/NR Conservation Practices.

Conservation Practice Standard Code	Conservation Practice Name	Purpose	Sediment Reduction	Nutrients (Nitrogen and Phosphorous)
314	Brush Management	Create the desired plant community consistent with the ecological site. Restore or release desired vegetative cover to protect soils, control erosion, reduce sediment, improve water quality or enhance stream flow. Maintain, modify, or enhance fish and wildlife habitat. Improve forage accessibility, quality and quantity for livestock and wildlife. Manage fuel loads to achieve desired conditions.	X	X

[65] Not all applications of CPS 666 require ground disturbance, but when ground disturbance is required, these are the types of short-term adverse effects that normally occur.

Conservation Practice Standard Code	Conservation Practice Name	Purpose	Sediment Reduction	Nutrients (Nitrogen and Phosphorous)
390	Riparian Herbaceous Cover	Provide or improve food and cover for fish, wildlife and livestock. Improve and maintain water quality. Establish and maintain habitat corridors. Increase water storage on floodplains. Reduce erosion and improve stability to stream banks and shorelines. Increase net carbon storage in the biomass and soil. Enhance pollen, nectar, and nesting habitat for pollinators. Restore, improve or maintain the desired plant communities. Dissipate stream energy and trap sediment. Enhance stream bank protection as part of stream bank soil bioengineering practices.	X	X
644	Wetland Wildlife Habitat Management	To maintain, develop, or improve wetland habitat for waterfowl, shorebirds, fur-bearers, or other wetland dependent or associated flora and fauna.	X	X
391	Riparian Forest Buffer	Create shade to lower or maintain water temperatures to improve habitat for aquatic organisms. Create or improve riparian habitat and provide a source of detritus and large woody debris. Reduce excess amounts of sediment, organic material, nutrients and pesticides in surface runoff and reduce excess nutrients and other chemicals in shallow ground water flow. Reduce pesticide drift entering the water body. Restore riparian plant communities. Increase carbon storage in plant biomass and soils.	X	X
342	Critical Area Planting	Stabilize areas with existing or expected high rates of soil erosion by wind or water. Stabilize stream and channel banks, pond and other shorelines, earthen features of structural conservation practices. Stabilize areas such as sand dunes and riparian areas.	X	-
580	Streambank and Shoreline Protection	Prevent the loss of land or damage to land uses, or facilities adjacent to the banks of streams or constructed channels, shoreline of lakes, or estuaries including the protection of known historical, archeological, and traditional cultural properties. Maintain the flow capacity of streams or channels. Reduce the offsite or downstream effects of sediment resulting from bank erosion. To improve or enhance the stream corridor for fish and wildlife habitat, aesthetics, recreation.	X	-
410	Grade Stabilization Structure	Stabilize grade, reduce erosion, or improve water quality.	X	X
666	Forest Stand Improvement	Improve and sustain forest health and productivity. Reduce damage from pests and moisture stress. Initiate forest stand regeneration. Reduce fire risk and hazard and facilitate prescribed burning. Restore or maintain natural plant communities. Improve wildlife and pollinator habitat. Alter quantity, quality, and timing of water yield. Increase or maintain carbon storage.	X	-

Soil and Water Conservation/NR Practices: Examples of conservation practices that support soil and water conservation/NR benefits (Table 3.9-3) include conservation practices implemented primarily on agricultural lands including cropland and pasture/grassland, and forestland to provide nutrient reduction through removal and management of sediment, nitrogen, phosphorous and animal waste. Twelve conservation practices that include crop management measures, plantings, nutrient management, and construction measures to reduce erosion and control runoff are highlighted in this RP/EA as examples of conservation practices likely to be implemented under the proposed alternatives that also have potential for adverse impacts. The Grassed Waterway practice (CPS 412), Stream Crossing (CPS 578), and Terrace (CPS 600) are discussed further in Section 3.9.1. Because the USDA-NRCS analysis of the effects of the conservation practices listed in Appendix B has been incorporated by reference, any of a number of those practices could be implemented under the proposed action alternative; the conservation practices funded would not be limited to those discussed here and the actual practices selected for each project site and their anticipated impacts would be documented on the Environmental Evaluation Worksheet.

Table 3.9-3: Exemplar -Soil and Water Conservation/NR Conservation Practices.

Conservation Practice Standard Code	Conservation Practice Name	Purpose	Reduction of Sediment	Nutrient Reduction (Nitrogen and Phosphorous)	Animal waste
412	Grassed Waterway	Convey runoff from terraces, diversions, or other water concentrations without causing erosion or flooding. To prevent gully formation. To protect/improve water quality.	X	X	-
328	Conservation Crop Rotation	Reduce sheet, rill and wind erosion. Maintain or increase soil health and organic matter content. Reduce water quality degradation due to excess nutrients. Improve soil moisture efficiency. Reduce the concentration of salts and other chemicals from saline seeps. Reduce plant pest pressures. Provide feed and forage for domestic livestock. Provide food and cover habitat for wildlife, including pollinator forage, and nesting.	X	X	-
342	Critical Area Planting	Stabilize areas with existing or expected high rates of soil erosion by wind or water. Stabilize stream and channel banks, pond and other shorelines, earthen features of structural conservation practices. Stabilize areas such as sand dunes and riparian areas.	X	-	-
329	Residue & Tillage Management	Reduce sheet, rill, and wind erosion and excessive sediment in surface waters. Reduce tillage-induced particulate emissions. Maintain or increase soil health and organic matter content. Reduce energy use.	X	X	-
393	Filter Strip	Reduce suspended solids and associated contaminants in runoff and excessive sediment in surface waters. Reduce dissolved contaminant loadings in runoff. Reduce suspended solids and associated contaminants in irrigation tailwater and excessive sediment in surface waters.	X	X	-

Conservation Practice Standard Code	Conservation Practice Name	Purpose	Reduction of Sediment	Nutrient Reduction (Nitrogen and Phosphorous)	Animal waste
340	Cover Crop	Reduce erosion from wind and water. Maintain or increase soil health and organic matter content. Reduce water quality degradation by utilizing excessive soil nutrients. Suppress excessive weed pressures and break pest cycles. Improve soil moisture use efficiency. Minimize soil compaction.	X	X	-
576	Livestock Shelter Structure	To provide protection for livestock from excessive heat, wind, cold. Protect surface waters from nutrient and pathogen loading. Protect wooded areas from accelerated erosion and excessive nutrient deposition by providing alternative livestock shelter/shade location. Improve the distribution of grazing livestock to enhance wildlife habitat, reduce over-used areas, or correct other resource concerns resulting from improper livestock distribution.	X	X	X
578	Stream Crossing	Provide access to another land unit. Improve water quality by reducing sediment, nutrient, organic, and inorganic loading of the stream. Reduce streambank and streambed erosion.	X	X	X
600	Terrace	Reduce erosion and trap sediment. Retain runoff for moisture conservation.	X	X	-
590	Nutrient Management	Budget, supply, and conserve nutrients for plant production. To minimize agricultural nonpoint source pollution of surface and groundwater resources. To properly utilize manure or organic by-products as a plant nutrient source. To protect air quality by reducing odors, nitrogen emissions (ammonia, oxides of nitrogen), and the formation of atmospheric particulates. To maintain or improve the physical, chemical, and biological condition of soil.	-	X	-
528	Prescribed Grazing	Improve or maintain desired species composition and vigor of plant communities. Improve or maintain quantity and quality of forage for grazing and browsing animals' health and productivity. Improve or maintain surface and/or subsurface water quality and quantity. Improve or maintain riparian and watershed function. Reduce accelerated soil erosion, and maintain or improve soil condition. Improve or maintain the quantity and quality of food and/or cover available for wildlife. Manage fine fuel loads to achieve desired conditions.	X	X	-
317	Composting Facility	Reduce water pollution potential and improve handling characteristics of organic waste solids, reuse organic waste as animal bedding, or use as a soil amendment that provides soil conditioning, slow-release plant-available nutrients and plant disease suppression.	-	X	X

Table 3.9-4 lists the land use categories, acreages, and the categories of conservation practices that potentially could be prescribed.

Table 3.9-4: Potential Conservation Practice by Land Use Category.

Land Use	Acres	Planning Area[66]	Ecological/NR Conservation Practices	Soil and Water Conservation /NR Practices
Associated Agriculture Lands	40,322	0	X	X
Cropland	3,580	2,000		X
Pasture/Grassland	135,078	11,000		X
Forestland	248,874	7,000	X	X
Developed Land (Urban)	45,689	0		
Open Water	6,263	0		
Total	479,806	20,000		

3.9.1 NR (Nonpoint Source) Alternatives A and B: Affected Environment and Environmental Consequences

This section describes the affected environment and the environmental consequences for proposed NR (Nonpoint Source) Alternatives A and B within the Chunky-Okatibbee watershed. The project area for the proposed alternatives is depicted in Figure 3.9-1 for Alternative A (Preferred): Upper Pascagoula Water Quality Enhancement Project and Alternative B: Pascagoula River Basin Riparian Buffer Maintenance Plan.

Alternative A (Preferred): Upper Pascagoula River Water Quality Enhancement Project
If selected, proposed Alternative A, Upper Pascagoula Water Quality Enhancement Project (Preferred) would be implemented by USDA-NRCS for the purpose of improving water quality through the development and implementation of conservation plans to reduce nutrient and sediment runoff closest to the source of soil erosion and nutrient application as well as in riparian areas. The Upper Pascagoula River Water Quality Enhancement project (Alternative A-Preferred) would include implementation of conservation practices from both the Ecological/NR and Soil and Water Conservation/NR categories described in Section 3.9 (Table 3.9-2, Table 3.9-3; Appendix B). USDA-NRCS would provide outreach and technical assistance to voluntary participants (landowners) to develop conservation plans and would use all available conservation practices typically planned and funded by USDA-NRCS programs. USDA-NRCS would develop conservation plans within a 20,000-

[66] Estimated planning area is based on preliminary project development and may be modified (increased or decreased) during project implementation considering factors including but not limited to: landowner participation, proximity of existing conservation practices, costs, and opportunities for implementation of conservation actions and practices.

acre area with a priority on opportunities that are within one mile of tributaries (See Table 3.9-4). Conservation practices would be implemented on cropland, pasture/grassland, forestland, and associated agriculture lands within the Chunky-Okatibbee watersheds with emphasis given to properties bordering rivers and streams. The MS TIG would allocate $4.0 M from the NR Restoration Type for this alternative.

Alternative B: Pascagoula River Basin Riparian Buffer Maintenance Plan (Proposed Action)
The Pascagoula River Basin Riparian Buffer Maintenance Plan (Alternative B) would also be implemented by USDA-NRCS for the purpose of improving water quality through the development and implementation of conservation plans to reduce nutrient and sediment runoff by focusing conservation practices such as conservation buffers in riparian areas. Alternative B would include implementation of Ecological/NR conservation practices as described in Section 3.9 (Table 3.9-2) and listed in Appendix B. The USDA-NRCS would provide outreach and technical assistance to voluntary participants (landowners) to develop conservation plans in riparian areas and would use all available conservation practices typically planned and funded by USDA-NRCS programs. The USDA-NRCS would develop conservation plans within a 20,000-acre area with priority on opportunities that are within one mile of tributaries. Conservation practices would be implemented in riparian areas within forestland and associated agriculture lands on farmsteads in the Chunky-Okatibbee watersheds in Mississippi. Similar to Alternative A, conservation planning would be completed within a 20,000-acre area with a priority on opportunities that are within one mile of tributaries (See Table 3.9-4). Alternative B differs from Alternative A only in that the conservation practices would primarily be Ecological/NR practices (Appendix B) that would be implemented in riparian areas within associated agriculture lands and forestland in the Chunky-Okatibbee watersheds in Mississippi. The MS TIG would allocate $4.0 M from the NR (Nonpoint Source) Restoration Type for this alternative.

Exemplar Conservation Practices Analyzed in this Plan: Table 3.9-5 provides a description of the types of work that would be carried out in order to implement each of the exemplar conservation practices discussed in this RP/EA, including both the Ecological/NR conservation practices and Soil and Water Conservation/NR practices. The affected environment and environmental consequences for these exemplar conservation practices are included in Sections 3.9.1.1 through 3.9.1.4. Appendix B provides the list of conservation practices contemplated for proposed NR (Nonpoint Source) Alternatives A and B. Appendix C provides the conservation practice network effects diagram for the example practices analyzed in this RP/EA.

Table 3.9-5: Example Ground-Disturbing Conservation Practices-Description of Work.

Practice Code	Conservation Practice Name	Purpose/Description of work
Exemplar Ecological/NR Conservation Practices (Alternative A and B)		
580	Streambank and Shoreline Protection	**Purpose/Description of Work:** Prevent the loss of land or damage to land uses, or facilities adjacent to the banks of streams or constructed channels, shoreline of lakes, or estuaries including the protection of known historical, archeological, and traditional cultural properties. Maintain the flow capacity of streams or channels. Reduce the offsite or downstream effects of sediment resulting from bank erosion. To improve or enhance the stream corridor for fish and wildlife habitat, aesthetics, recreation. Site-specific work would include treatment(s) used to stabilize and protect banks of streams or constructed channels, and shorelines of lakes, reservoirs, or estuaries. Heavy equipment would be used to regrade selected shorelines and streambanks and deposit erosion control materials such as rip rap or green controls. The site will be replanted with native herbaceous/tree species.

Practice Code	Conservation Practice Name	Purpose/Description of work
410	Grade Stabilization Structure	**Purpose/Description of Work:** Stabilize grade, reduce erosion, or improve water quality. Site-specific construction would include installation of grade stabilization structure(s) used to control the grade in natural or constructed channels. Heavy equipment would be used to regrade selected streams and install grade control structures such as embankments, drop/chute/box inlet drop spillways, side-inlet, open weir, or pipe-drop drainage structures. The site will be replanted with native herbaceous/tree species.
666	Forest Stand Improvement	**Purpose/Description of work:** Improve and sustain forest health and productivity. Reduce damage from pests and moisture stress. Initiate forest stand regeneration. Reduce fire risk and hazard and facilitate prescribed burning. Restore or maintain natural plant communities. Improve wildlife and pollinator habitat. Alter quantity, quality, and timing of water yield. Increase or maintain carbon storage. Site-specific work would include the manipulation of species composition, stand structure, or stand density by cutting or killing selected trees or understory vegetation to achieve desired forest conditions or obtain ecosystem services. Improvement, such as invasive or unwanted species removal, thinning, and planting/seeding would potentially utilize heavy equipment. Treatments could include, but are not limited to, mowing, planting/seeding, felling, tilling, or chemical treatment. Planting could include the use of seed drills or other planting/seeding equipment.
Exemplar Soil and Water Conservation/NR Conservation Practices (Alternative A)		
412	Grassed Waterway	**Purpose/Description of work:** Convey runoff from terraces, diversions, or other water concentrations without causing erosion or flooding. To prevent gully formation. To protect/improve water quality. Site-specific work would include the construction of a shaped or graded channel that is established with suitable vegetation to convey surface water at a non-erosive velocity using a broad and shallow cross section to a stable outlet. Selected sites would be prepared for planting by potentially using equipment to remove vegetation and other debris. Site preparation treatments could include tilling, or chemical treatment. Planting could include the use of seed drills or other planting/seeding equipment.
578	Stream Crossing	**Purpose/Description of work:** Provide access to another land unit. Improve water quality by reducing sediment, nutrient, organic, and inorganic loading of the stream. Reduce streambank and streambed erosion. Site-specific work would include construction of a stabilized area or structure constructed across a stream to provide a travel way for people, livestock, equipment, or vehicles. A ford, bridge, or culvert structure could be installed. Heavy equipment would be used to regrade the stream and construct the structure. The area will be replanted with native vegetation.
600	Terrace	**Purpose/Description of work**: Reduce erosion and trap sediment. Retain runoff for moisture conservation. Site specific work would include construction of an earth embankment, or a combination ridge and channel, constructed across the field slope. Heavy equipment would be used to regrade the selected area into a terrace system.

Best Practices: The MS TIG would consider best practices referenced in Section 6.15 and Appendix 6A of the PDARP/PEIS to avoid and minimize impacts to resources. Best practices listed in the PDARP/PEIS are intended to evolve as an adaptive management component of implementing the PDARP/PEIS; as such, the appendix to the PDARP/PEIS is a living document. In addition to PDARP/PEIS best practices that may apply to a particular location, USDA-NRCS will incorporate appropriate ESA conservation measures and other mitigation identified during the conservation planning and environmental evaluation process.

3.9.1.1 Overview of Affected Environment and Environmental Consequences

This analysis incorporates by reference the relevant portions of the affected environment description from Section 3.3.2 for Water Quality from the PDARP/PEIS. Likewise, the PDARP/PEIS provides programmatic evaluation of the environmental consequences from conduct of the restoration approaches “Reduce nutrient loads to coastal watersheds” considered in this plan. Those evaluations are incorporated by reference here, from Section 6.4.3 of PDARP/PEIS. Tiering from that analysis, this section presents the Affected Environment of the NR (Nonpoint Source) proposed alternatives and environmental consequences of the proposed actions in context of the project-specific affected environment.

The programmatic analysis looked at a series of resources as part of the physical, biological, and socioeconomic environment. As appropriate in a tiered analysis, the evaluation of each alternative focuses on the specific resources with a potential to be affected by the proposed project. To avoid redundant or unnecessary information, resources that are not expected to be affected are evaluated summarily in the respective sections. These resources include, air quality and greenhouse gas emissions, noise, marine and estuarine fauna, infrastructure, tourism and recreation, fisheries and aquaculture, marine transportation, land and marine management and aesthetics and visual resources which will be discussed in Sections 3.9.1.2, 3.9.1.3, and 3.9.1.4.

3.9.1.2 Physical Environment

Introduction to Affected Environment (Physical Environment): Geology and Substrates and Hydrology and Water Quality are discussed in this section. PDARP/PEIS Sections 3.3.1, 3.3.2, 3.3.3 and 3.5.1 are incorporated by reference here. The affected environment for the proposed alternatives physical environment is described in respective sections below.

Programmatic Review of Environmental Consequences (Physical Environment): Sections 6.4.3.1 of the PDARP/PEIS describe the impacts to Physical Resources for the relevant restoration approaches and are incorporated by reference and briefly described here. In addition, this EA incorporates by reference pages 27 to 34 of the 2009 EQIP Programmatic EA characterizing prime and unique agricultural lands and forest lands, and pages 36 and 37 which characterize soil resources, as well as pages 15 through 19 of the 2014 EQIP Programmatic EA discussing soils; pages 45 and 46 of the 2009 EQIP Programmatic EA, which characterize water quality issues related to agriculture, the discussion on page 48 regarding the beneficial impacts of EQIP conservation practices to water quality, wetlands and floodplains, as well as pages 30 through 34 of the 2014 EQIP Programmatic EA discussing impacts of conservation practices on water quality and wetlands. This EA also incorporates by reference pages 54 through 57 of the 2009 EQIP Programmatic EA characterizing air quality issues related to agriculture and the effects of NRCS conservation practices.

PDARP/PEIS consequences related to geology and substrates and water resources: Some agricultural best practices include small-scale construction projects (e.g., to manage manure and runoff from feedlots). Therefore, during construction, short-term, minor adverse impacts on geology, substrate, hydrology, surface and ground water quality (e.g., nutrients, fertilizers, pesticides, total suspended solids in runoff, and high-conductivity ground water) would be anticipated. Short-term adverse impacts would be minimized by implementing best practices. Long-term benefits are expected to result because these conservation practices would reduce nutrients, slow erosion, stabilize soils, improve water quality, and increase ground water recharge.

As appropriate in a tiered analysis, the evaluation of the alternatives focuses on the specific resources with a potential to be affected. Air quality and greenhouse gas emissions and noise impacts for the proposed alternatives would be negligible to minor. To avoid redundant or unnecessary information, these resources are evaluated here.

Air Quality and Greenhouse Gas Emissions: Counties where the proposed alternative project area are located are classified as in attainment, meaning criteria air pollutants do not exceed National

Ambient Air Quality Standards (NAAQS).[67] The primary sources of emissions during project implementation would 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 within the range of normal farmstead operation, which do not impact air quality. Conservation practices would occur seasonally, and would likely not occur simultaneously. Whether activities occurred simultaneously or incrementally, the proposed alternatives would have no long-term adverse impacts on air quality or to emissions of greenhouse gases. Conservation practices on forested areas could result in a long-term beneficial impact on air quality resulting from more vigorous long-standing forested areas, which help to sequester carbon. In addition, the following best practices would be implemented, to the extent practicable, for the proposed alternatives:

- Shut down idling restoration equipment, if feasible.
- Locate staging areas as close to restoration sites as practicable to minimize driving distances between staging areas and restoration sites.
- Encourage the use of the proper size of equipment for the job to maximize energy efficiency.
- Encourage the use of alternative fuels or power sources for generators at restoration sites, such as propane or solar power, or use electrical power where practicable.

Noise: There would be short-term minor adverse noise impacts from equipment and operations associated with the installation of various conservation practices. Conservation practices would be implemented sporadically and seasonally and on private land, not near densely populated areas. The types of noise produced would be typical of farmstead operations (e.g. plowing, harvesting, small earthmoving activities, land clearing). The operations would be short- term and remote from nearby receptors.

For the physical environment, the following resources are further analyzed in this section:

- Geology and Substrates
- Hydrology and Water Quality

3.9.1.2.1 Geology and Substrates

Affected Environment
The project area for the proposed alternatives is located within the Tombigbee Hills physiographic region. Sediments are generally composed of sands, clays, and gravels of the Tuscaloosa and Eutaw formations (Cretaceous). The soils are highly weathered, acidic and include very old ultisols, few alfisols, entisols in stream drainages soil orders (Stewart 2003).

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[67] https://www.deq.state.ms.us/MDEQ.nsf/pdf/Air_2015AirQualityDataSummary/$File/2015%20Air%20Quality%20Data%20Summary.pdf

Topography in the area varies from undulating broad plateau areas between major stream systems to rugged dissected uplands, characterized by steep side slopes and narrow ridgetops. All the major streams have fairly broad valleys with floodplains bordered by one or more low terraces. Okatibbee Creek and Chunky River flow into the Chickasawhay River, which flows into the Pascagoula River (USDA 1983).

According to national land cover database, land use within the Chunky-Okatibbee watershed includes 3,580 acres of cropland, 40,322 acres of associated agriculture lands, 248,874 acres of forestland, and 135,078 acres that are used for pasture or to grow hay. There are an additional 45,689 acres of developed land and 6,263 acres of open water. Of this, approximately 2,000 acres of cropland, 11,000 acres of pasture/grassland, and 7,000 acres of forestland are within the project area.

Environmental Consequences for NR (Nonpoint Source) Proposed Alternatives A (Preferred) and B

Table 3.9-6 provides a summary of the soil impacts associated with exemplar conservation practices proposed for implementation in the project area for Alternative A (Preferred): Upper Pascagoula Water Quality Enhancement and Alternative B: Pascagoula River Basin Riparian Buffer Maintenance Plan. There would be no adverse impacts to geology as a result of the project; soil impacts are summarized below.

Table 3.9-6: Summary of Soil Impacts.

Practice Code	Conservation Practice Name	Alternative A: Upper Pascagoula Water Quality Enhancement- (Preferred)				Alternative B: Pascagoula River Basin Riparian Buffer Maintenance Plan		
		Adverse Impact Duration	Adverse Impact Intensity	Beneficial Impact Duration		Adverse Impact Duration	Adverse Impact Intensity	Beneficial Impact Duration
Typical Conservation Practices (Ecological/NR) that Provide NR Benefits								
580	Streambank and Shoreline Protection	short-term	minor to moderate	long-term		short-term	minor to moderate	long-term
410	Grade Stabilization Structure	short-term	minor to moderate	long-term		short-term	minor to moderate	long-term
666	Forest Stand Improvement	short-term	minor	-		short-term	minor	-
Typical Conservation Practices (Soils and Water Conservation/NR) that provide NR Benefits								
412	Grassed Waterway	short-term	minor to moderate	long-term		-	-	-
578	Stream Crossing	short-term	minor to moderate	long-term		-	-	-
600	Terrace	short-term	minor to moderate	long-term		-	-	-

Conservation Practices (Ecological/NR)

Streambank and Shoreline Protection (580): This practice would be applied to stabilize and protect banks of streams or constructed channels and shorelines of open water bodies and can reduce the offsite effects of sediment resulting from bank erosion. There would be short-term, minor to moderate adverse impacts 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. Areas would be replanted with native vegetation and/or seeded to prevent erosion after bank regrading. Erosion control plans would be implemented during and after construction. Impacts would be applicable to Alternative A and Alternative B.

Grade Stabilization Structure (410): This practice would be used for grade stabilization and preventing formation of advance gullies and headcuts. 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. Areas would be replanted or seeded to prevent erosion after bank regrading. Erosion control plans would be implemented during and after construction. Impacts would be applicable to Alternative A and Alternative B.

Forest Stand Improvement (666): There would be short-term, minor 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. Impacts would be applicable to Alternative A and Alternative B.

Conservation Practices (Soil and Water Conservation/NR)

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. The grassed waterway practice would be implemented primarily on cropland as part of Alternative A; impacts would not be applicable to Alternative B.

Stream Crossing (578): There would be short-term, minor to moderate impacts to the streambed 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 location. Fences would prevent riparian area grazing and resultant animal waste/nutrient contribution in and near waterways. This practice would be implemented primarily on pastureland/grassland as part of Alternative A; impacts would not be applicable to Alternative B.

Terrace (600): This practice would be used to create an earth embankment, channel, or a combination of ridge and channel constructed across a slope to intercept runoff. 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. Areas not in crop production would be replanted or seeded to prevent erosion after bank regrading. Erosion control plans would be implemented during and after construction. This practice would be implemented primarily on cropland as part of Alternative A; impacts would not be applicable to Alternative B.

Best Practices

The MS TIG would consider best practices referenced in Section 6.15 and Appendix 6A of the PDARP/PEIS. Additional best practices may be recommended for site-specific conservation practices in different locations due to differences in relevant conditions. The following best practices are contemplated and would be implemented to the extent practicable in order to avoid and minimize impacts to geology and substrates (soils):

- Impacts due to conservation practice implementation would be minimized by limiting operations to favorable conditions when soils are not saturated, and minimizing the disturbance footprint. Permits or authorizations would be obtained from the U.S. Army Corps of Engineers as appropriate, with adherence to any permit conditions.
- To avoid water quality impacts an erosion control plan would be developed and could consist of the use of vegetative buffers (100 feet or greater), revegetation with native species or annual grasses, and any other measures needed to prevent sediment from reaching protected species or their habitats.
- Develop and implement a spill prevention and response plan, including conducting daily inspections of all construction and related equipment to ensure there are no leaks of antifreeze, hydraulic fluid, or other substances and cleaning and sealing all equipment that would be used in the water to rid it of chemical residue. Develop a contract stipulation to disallow use of any leaking equipment or vehicles.
- Prohibit use of hazardous materials, such as lead paint, creosote, pentachlorophenol, and other wood preservatives during construction in, over or adjacent to, sensitive sites during construction and routine maintenance.

No Action Alternative

Under the No Action Alternative, the MS TIG would not implement any projects for the NR (Nonpoint Source) Restoration Type at this time, and would instead allow natural recovery processes to occur (outcomes described in Section 3.8). The No Action Alternative would not provide benefits to soils or geology when compared to Alternatives A and B. 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 would occur through the action alternatives.

3.9.1.2.2 Hydrology and Water Quality

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. The affected environment consists of numerous named and unnamed tributaries in the Upper Pascagoula River system as well as various farm ponds, lakes, and wetlands. Mississippi's water quality standards specify the appropriate levels for which various water quality parameters or indicators support a water body's designated use(s). Each use assessed for a water body is determined to be either "Attaining" or "Not Attaining" in accordance with the applicable water quality standards and U.S. Environmental Protection Agency (EPA) guidelines for assessments pursuant to §305(b). A water body's use is said to be impaired when—based on current and reliable site-specific data of sufficient quantity, quality, and frequency of collection—it is not attaining its designated use(s). Where data and information of appropriate quality and quantity indicate non-attainment of a designated use or uses for an assessed water body, the water body would be placed on the Mississippi 2014 Section 303(d) List of Impaired Water Bodies (MDEQ 2014).

The proposed alternatives are located in the Chunky-Okatibbee subbasin, and have a drainage area of approximately 479,806 acres. The proposed alternatives include portions of Lauderdale, Newton, Clark, Jasper, and Neshoba counties. Named tributaries within the Chunky-Okatibbee subbasin include (but are not limited to) the Chunky River, Okatibbee Creek, Sowashee Creek, Tallashua Creek, Tallahatta Creek, and Suqualena Creek, all of which are part of the Pascagoula River system. Major rivers carry high sediment loads into the Mississippi Sound. Pollution from agriculture, improperly treated sewage, roadways, accidental spills, industry discharges, and other sources also affect the health of the habitats.

The waters in this area are classified by the State of Mississippi Water Quality Criteria for Intrastate, Interstate, and Coastal Waters (MDEQ 2012) as "public water supply," "recreation," and "fish and wildlife." The following water bodies are listed as impaired on the State of Mississippi 303(d) list (MDEQ 2014):

- Sowashee Creek: Total Nitrogen, Total Phosphorus
- Northern Reach of Okatibbee Creek: Biological Impairment, pH, Total Nitrogen
- Southern Reach of Okatibbee Creek: Biological Impairment
- Tallashua Creek: Biological Impairment
- Chunky Creek: Biological Impairment
- Anderson Brand: Biological Impairment

Floodplains

There are three flood zone categories within the proposed alternative(s) project area: A, AE, and X. Zone A is defined as Areas subject to inundation by the 1-percent-annual-chance flood event generally determined using approximate methodologies. Because detailed hydraulic analyses have not been performed, there are no Base Flood Elevations (BFEs). Mandatory flood insurance purchase requirements and floodplain management standards apply. Zone AE is defined as "Base Flood Elevations Determined." Upland areas are mostly Zone X. Zone X are defined as "Areas of 0.2% annual chance flood; areas of 1% annual chance flood with average depths of less than 1 foot or with drainage areas less than 1 square mile; and areas protected by levees from 1% annual chance flood."

Wetlands

Wetlands in the proposed alternative(s) project area are a mix of palustrine emergent, palustrine forested, and palustrine scrub-shrub wetlands. They are generally located in shallow depressions at lower elevations or within a floodplain, as fringe wetlands are open water, or adjacent to tributaries or oxbow or lowland features. They can originate from hill seeps, or hold water for long periods of time after rain or flood events.

Of the 479,806 acres in the Chunky-Okatibbee watershed the National Wetland Inventory identifies over 56,871 acres of land as wetland or open water.

Environmental Consequences for NR (Nonpoint Source) Proposed Alternatives A (Preferred) and B
All of the conservation practices would be implemented voluntarily on privately owned land. Detailed information on the conservation practices that may be applied, including practice standards, network effect diagrams, and conservation practice physical effects can be found at https://www.nrcs.usda.gov/wps/portal/nrcs/detailfull/national/technical/cp/ncps/?cid=nrcs143_026849.

Environmental consequences affecting hydrology, water quality, wetlands, and floodplains are discussed below.

Hydrology

Table 3.9-7 provides a summary of the hydrology impacts for exemplar conservation practices proposed for implementation in the project area for Alternative A (Preferred): Upper Pascagoula Water Quality Enhancement and Alternative B: Pascagoula River Basin Riparian Buffer Maintenance Plan.

Table 3.9-7: Summary of Hydrology Impacts**.**

Practice Code	Conservation Practice Name	Alternative A: Upper Pascagoula Water Quality Enhancement- (Preferred)				Alternative B: Pascagoula River Basin Riparian Buffer Maintenance Plan		
		Adverse Impact Duration	Adverse Impact Intensity	Beneficial Impact Duration		Adverse Impact Duration	Adverse Impact Intensity	Beneficial Impact Duration
HYDROLOGY								
Typical Conservation Practices (Ecological/NR)- that Provide NR Benefits								
580	Streambank and Shoreline Protection	short-term	minor	long-term		short-term	minor to moderate	long-term
410	Grade Stabilization	short-term	minor	long-term		short-term	minor to moderate	long-term
666	Forest Stand Improvement	short-term	minor	long-term		short-term	minor	long-term
Typical Conservation Practices (Soils and Water Conservation/NR) that provide NR Benefits								
412	Grassed Waterway	-	-	long-term		-	-	-
578	Stream Crossing	long-term	minor	long-term		-	-	-
600	Terrace	short-term	minor to moderate	long-term		-	-	-

Conservation Practices (Ecological/NR)

Streambank and Shoreline Protection (580): This practice would be applied to stabilize and protect banks of streams or constructed channels and shorelines of open water bodies. 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. Areas would be replanted with native vegetation and or seeded to restore streambank vegetation. Erosion control plans would be implemented during and after construction. Impacts would be applicable to Alternative A and Alternative B.

Grade Stabilization Structure (410): This practice would be used for grade stabilization, prevent formation of advance gullies and headcuts. 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 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. Areas would be replanted or seeded to prevent erosion and gully formation after regrading. Erosion control plans would be implemented during and after construction. Impacts would be applicable to Alternative A and Alternative B.

Forest Stand Improvement (666): There would be short-term, minor, 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. Between the time that any vegetation is cleared to the time that ground cover regrows, runoff and increased hydrology could occur. There would be long-term beneficial impacts from healthier forest stands. Removal of overstory canopy can increase the amount and vigor of ground cover, slowing runoff and increasing infiltration. Impacts would be applicable to Alternative A and Alternative B.

Conservation Practices (Soil and Water Conservation/NR)

Grassed Waterway (412): 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. The grassed waterway practice would be done primarily on cropland as part of Alternative A; impacts would not be applicable to Alternative B.

Stream Crossing (578): There would be long-term, minor, adverse impacts to the streambed from stabilizing an area for designated crossing, installation of culverts of 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. If fences are installed with the crossing, it would prevent riparian area grazing and ground cover grazing that would result in decreased infiltration. This practice would be done primarily on pastureland/grassland as part of Alternative A; impacts would not be applicable to Alternative B.

Terrace (600): This practice would be used to create an earth embankment, channel, or a combination of ridge and channel constructed across a slope to intercept runoff. There would be short-term, minor to moderate, adverse impacts to hydrology as a result of soil excavation and grading to construct or install terraces. The majority of terraces would be installed in agricultural fields. There would be long-term, beneficial impacts to hydrology from the reduction of runoff, increased water storage and prevention of gully formation. Areas not in crop production would be replanted or seeded to prevent erosion after bank regrading. Erosion control plans would be implemented during and after construction. This practice would be implemented primarily on cropland as part of Alternative A; impacts would not be applicable to Alternative B.

Water Quality

Table 3.9-8 provides a summary of the water quality impacts for representative conservation practices proposed for implementation in the project area for Alternative A (Preferred): Upper Pascagoula Water Quality Enhancement and Alternative B: Pascagoula River Basin Riparian Buffer Maintenance Plan.

Table 3.9-8: Summary of Water Quality Impacts.

Practice Code	Conservation Practice Name	Alternative A: Upper Pascagoula Water Quality Enhancement-Preferred				Alternative B: Pascagoula River Basin Riparian Buffer Maintenance Plan		
		Adverse Impact Duration	Adverse Impact Intensity	Beneficial Impact Duration		Adverse Impact Duration	Adverse Impact Intensity	Beneficial Impact Duration
WATER QUALITY								
Typical Conservation Practices (Ecological/NR) that Provide NR Benefits								
580	Streambank and Shoreline Protection	short-term	minor	long-term		short-term	minor to moderate	long-term
410	Grade Stabilization	short-term	minor	long-term		short-term	minor to moderate	long-term
666	Forest Stand Improvement	-	-	long-term		-	-	long-term
Typical Conservation Practices (Soils and Water Conservation/NR) that provide NR Benefits								
412	Grassed Waterway	short-term	minor to moderate	long-term		-	-	-
578	Stream Crossing	short-term	minor	long-term		-	-	-
600	Terrace	short-term	minor- to moderate	long-term		-	-	-

Conservation Practices (Ecological/NR)

Streambank and Shoreline Protection (580): This practice would be applied to stabilize and protect banks of streams or constructed channels and shorelines of open water bodies. 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. Areas would be replanted with native vegetation and or seeded to prevent erosion. Erosion control plans would be implemented during and after construction. Impacts would be applicable to Alternative A and Alternative B.

Grade Stabilization Structure (410): 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. 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 from drainageway stabilization. Areas would be replanted or seeded to prevent erosion and gully formation after bank regrading. Erosion control plans would be implemented during and after construction. Impacts would be applicable to Alternative A and Alternative B.

Forest Stand Improvement (666): There would be no adverse impacts to water quality. There would be long-term benefits as a result of this practice. Reduction of overstory canopy can increase the amount and vigor of ground cover, slowing runoff and increasing infiltration. Managing for desirable plant health and vigor reduces the need for pesticide applications. Reduced stand density can increase infiltration and leaching of salts. Removal of canopy/woody vegetation exposes the site and increases mortality of pathogens that would have otherwise entered surface water. Impacts would be applicable to Alternative A and Alternative B.

Conservation Practices (Soil and Water Conservation/NR)

Grassed Waterway (412): 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. The grassed waterway practice would be implemented primarily on cropland as part of Alternative A; impacts would not be applicable to Alternative B.

Stream Crossing (578): There would be short-term, minor impacts 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. This practice would be implemented primarily on pastureland/grassland as part of Alternative A; impacts would not be applicable to Alternative B.

Terrace (600): This practice would be used to create an earth embankment, channel, or a combination of ridge and channel constructed across a slope to intercept runoff. There would be short-term, minor to moderate, adverse impacts from the potential of increased erosion during soil excavation and grading to construct or install terraces. The majority of these would be installed in agricultural fields. There would be long-term, beneficial impacts from the reduction of runoff that could contain contaminants, and prevention of erosion. Areas not in crop production would be replanted or seeded to prevent erosion after bank regrading. Erosion control plans would be implemented during and after construction. The grassed waterway practice would be implemented primarily on cropland as part of Alternative A; impacts would not be applicable to Alternative B.

Floodplains

Activities proposed under Alternatives A and B 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.

Wetlands

Various conservation practices could have impacts to wetlands. The impacts could be from regrading or clearing areas for streambank stabilization or other similar conservation practices. U.S. Army Corps of Engineers permits or authorizations would be obtained as applicable, with adherence to any permit conditions. Table 3.9-9 provides a summary of wetland impacts for representative conservation practices proposed for implementation in the project area for Alternative A (Preferred): Upper Pascagoula Water Quality Enhancement and Alternative B: Pascagoula River Basin Riparian Buffer Maintenance Plan.

Table 3.9-9: Summary of Impacts to Wetlands.

Practice Code	Conservation Practice Name	Alternative A: Upper Pascagoula Water Quality Enhancement-Preferred			Alternative B: Pascagoula River Basin Riparian Buffer Maintenance Plan		
		Adverse Impact Duration	**Adverse Impact Intensity**	**Beneficial Impact Duration**	**Adverse Impact Duration**	**Adverse Impact Intensity**	**Beneficial Impact Duration**
WETLANDS							
Typical Conservation Practices (Ecological/NR) that Provide NR Benefits							
580	Streambank and Shoreline Protection	short-term	minor to moderate	long-term	short-term	minor to moderate	long-term
410	Grade Stabilization	short-term	minor to moderate	long-term	short-term	minor to moderate	long-term
666	Forest Stand Improvement	short-term	minor	long-term	short-term	minor	long-term
Typical Conservation Practices (Soils and Water Conservation/NR)- that provide NR Benefits							
412	Grassed Waterway	short-term	minor to moderate	long-term	-	-	-
578	Stream Crossing	short-term	minor to moderate	long-term	-	-	-
600	Terrace	short-term	minor to moderate	long-term	-	-	-

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 have a long-term, beneficial, impact on wetland water quality, hydrology, species composition and vigor. Wetlands impacts could be located on any land use type and the impacts are applicable to both Alternative A and Alternative B.

Best Practices

The MS TIG would consider best practices referenced in Section 6.15 and Appendix 6A of the PDARP/PEIS. Additional best practices may be recommended for site-specific conservation practices in different locations due to differences in relevant conditions. The following best practices are contemplated and would be implemented to the extent practicable in order to avoid and minimize impacts to wetlands:

- In the design of conservation practices the MS TIG would consider resiliency measures related to increasing storm intensities and changing weather patterns.
- Permits or authorizations would be obtained from the U.S. Army Corps of Engineers as appropriate, with adherence to any permit conditions.
- Develop and implement an erosion control plan to minimize erosion during and after construction and where possible use vegetative buffers (100 feet or greater), revegetate with native species or annual grasses, and conduct work during dry seasons.
- Develop and implement a spill prevention and response plan, including conducting daily inspections of all construction and related equipment to ensure there are no leaks of antifreeze, hydraulic fluid, or other substances and cleaning and sealing all equipment that would be used in the water to rid it of chemical residue. Develop a contract stipulation to disallow use of any leaking equipment or vehicles.
- Prohibit use of hazardous materials, such as lead paint, creosote, pentachlorophenol, and other wood preservatives during construction in, over or adjacent to, sensitive sites during construction and routine maintenance.
- Avoid and minimize, to the maximum extent practicable, placement of dredged or fill material in wetlands and other aquatic resources.
- Design construction equipment corridors to avoid and minimize impacts to wetlands and other aquatic resources to the maximum extent practicable.
- To the maximum extent possible, implement the placement of sediment to minimize impacts to existing vegetation or burrowing organisms.
- Apply herbicide in accordance with the direction and guidance provided on the appropriate U.S. Environmental Protection Agency (EPA) labels and state statutes during land-based activities.
- When local conditions indicate the likely presence of contaminated soils and sediments, test soil samples for contaminant levels and take precautions to avoid disturbance of, or provide for proper disposal of, contaminated soils and sediments. Evaluate methods prior to dredging to reduce the potential for impacts from turbidity or tarballs.
- Designate a vehicle staging area removed from any natural surface water resource or wetland to perform fueling, maintenance, and storage of construction vehicles and equipment. Inspect vehicles and equipment daily prior to leaving the storage area to ensure that no petroleum or oil products are leaking.
- Use silt fencing where appropriate to reduce increased turbidity and siltation in the project vicinity. This would apply to both upland and in-water work.

No Action Alternative

Under the No Action Alternative, the MS TIG would not implement any projects for the NR (Nonpoint Source) Restoration Type at this time, and would instead allow natural recovery processes to occur (outcomes described in Section 3.8). When compared to Alternatives A and B, the No Action

Alternative would not provide the benefits to hydrology, water quality, or wetlands that would result from the implementation of conservation practice. 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 would occur through the action alternatives.

3.9.1.3 Biological Environment

Introduction to Affected Environment (Biological Environment): Habitats, Wildlife, and Protected Species are discussed in this section. PDARP/PEIS Sections 3.4, 3.5, and 3.6 are incorporated by reference here. In addition, this EA incorporates by reference pages 61 to 65 of the 2009 EQIP Programmatic EA which characterizes biological resources including fish and wildlife habitat and pages 19 through 22 of the 2014 EQIP Programmatic EA concerning fish and wildlife habitat. The affected environment for the biological environment for the proposed alternatives is described in respective sections below.

Programmatic Review of Environmental Consequences (Biological Environment): Sections 6.4.3.1.2 of the PDARP/PEIS describe the impacts to biological resources for the relevant restoration approaches and are incorporated by reference and briefly described here.

PDARP/PEIS consequences related to biological resources: Depending on the projects implemented, short-term, minor adverse impacts may be anticipated during construction. For example, if construction includes earth-moving work, terrestrial vegetation may be disturbed. Benefits to biological resources such as benthic invertebrates, shellfish, finfish, and marine mammals could result from 1) improved water quality in the watershed and associated estuary and 2) reduced contaminant loadings (e.g., pesticides and fuel contaminants such as polyaromatic hydrocarbons and metals).

As appropriate in a tiered analysis, the evaluation the proposed alternative focuses on the specific resources with a potential to be affected. Marine and estuarine fauna impacts for the proposed alternatives would be negligible to minor. To avoid redundant or unnecessary information, these resources are evaluated here.

Marine and Estuarine Fauna (Submerged Aquatic Vegetation, Nearshore Benthic Invertebrates, Marine Mammals, Essential Fish Habitat): There would be no in-water marine work or work adjacent to estuarine habitats associated with these proposed alternatives. As a result, there would be no adverse impacts on these resources.

For the biological environment, the following resources are further analyzed in this section:

- Habitats and Wildlife
- Protected Species
- Migratory Birds

3.9.1.3.1 Habitats and Wildlife

Affected Environment
The project area for the proposed alternatives is located in the South Atlantic and Gulf Slope Cash Crops, Forest, and Livestock NRCS Land Resource Region (Land Resource Region P), and within Land Resource Region P is in the Southern Coastal Plain Major Land Resource Area (MLRA 133A-

1). Abundant moisture and a long growing season favor agricultural production in this region. The climate is hot and humid. It is characterized by long, hot summers and short, mild winters. The mean annual precipitation is 44 to 63 inches (1,120 to 1,600 millimeters). The native vegetation consists of oak-pine forests.

Timber production, cash-grain crops, and forage production are important in this MLRA. Soybeans, cotton, corn, and wheat are the major crops grown throughout the area but peanuts, rice, and sugarcane are also grown. Pastures are grazed mainly by beef cattle (*Bos Taurus*), but some dairy cattle and hogs (*Sus scrofa domesticus*) are raised in the area.

The major resource concerns are erosion, maintenance of the content of organic matter and productivity of the soils, control of surface water, artificial drainage, management of surface compaction and soil moisture, and prevention of groundwater contamination. Conservation practices on cropland generally include systems of crop residue management, cover crops, crop rotations, water disposal, subsoiling or deep tillage, pest management, and nutrient management. The most important conservation practice in pastured areas is prescribed grazing (USDA 2016).

The following land use categories (as previously described in Section 3.9) for the proposed Alternatives A and B are located in the Chunky-Okatibbee watershed: Associated Agriculture Lands, Crop, Pasture/Grassland, Forest, Developed Land (Urban), and Water. Conservation practices would be completed predominantly on cropland, pasture/grassland, forestland, and associated agriculture lands.

There are several conservation practices on forestland and riparian habitats. This area supports mixed oak-pine vegetation. Loblolly pine (*Pinus taeda*), longleaf pine (*Pinus palustris*), slash pine (*Pinus elliottii*), shortleaf pine (*Pinus echinata*), sweetgum (*Liquidambar styraciflua*), yellow-poplar (*Liriodendron tulipifera*), red oak (*Quercus rubra*), and white oak (*Quercus alba*) are the major overstory species. Dogwood (*Cornus* spp.), gallberry (*Ilex coriacea*), and farkleberry (*Vaccinium arboretum*) are the major understory species. Common sweetleaf (*Symplocos tinctoria*), American holly (*Ilex opaca*), greenbrier (*Smilax* spp.), southern bayberry (*Myrica cerifera*), little bluestem (*Schizachyrium scoparium*), Elliott bluestem (*Andropogon gyrans*), threeawn (*Aristida purpurea*), grassleaf goldaster (*Pityopsis oligantha*), native lespedezas (*Lespedeza* spp.), and low panicums (*Panicum* spp.) are other understory species.

Some of the major wildlife species in this area are white-tailed deer (*Odocoileus virginianus*), turkey (*Meleagris gallopavo*), rabbit (*Sylvilagus floridanus*), squirrel (*Sciurus* spp.), bobwhite quail (*Colinus virginianus*), and mourning dove (*Zenaida macroura*). The species of fish in the area include bass (*Micropterus salmoides*), bluegill (*Lepomis macrochirus*), and channel catfish (*Ictalurus punctatus*) (USDA 2016).

Invasive Species EO 13112 applies to all federal agencies whose actions may affect the status of invasive species, requires agencies to identify such actions, and to the extent practicable and permitted by law, requires agencies to 1) take actions specified in the Order to address the problem consistent with their authorities and budgetary resources and 2) not authorize, fund, or carry out actions that they believe are likely to cause or promote the introduction or spread of invasive species in the United States or elsewhere unless pursuant to guidelines that it has prescribed, the agency has determined and made public its determination that the benefits of such actions clearly outweigh the potential harm caused by invasive species; and 3) that all feasible and prudent measures to minimize risk of harm will be taken in conjunction with the actions. Best practices that would be used to control or eliminate invasive species are discussed in the environmental consequences section below.

Environmental Consequences for NR (Nonpoint Source) Proposed Alternatives A (Preferred) and B

Table 3.9-10 provides a summary of the environmental consequences to habitats and wildlife for representative conservation practices proposed for implementation in the project area for Alternative A (Preferred): Upper Pascagoula Water Quality Enhancement and Alternative B: Pascagoula River Basin Riparian Buffer Maintenance Plan.

Table 3.9-10: Summary of Impacts to Habitats and Wildlife**.**

Practice Code	Conservation Practice Name	Alternative A: Upper Pascagoula Water Quality Enhancement- (Preferred)				Alternative B: Pascagoula River Basin Riparian Buffer Maintenance Plan		
		Adverse Impact Duration	**Adverse Impact Intensity**	**Beneficial Impact Duration**		**Adverse Impact Duration**	**Adverse Impact Intensity**	**Beneficial Impact Duration**
Typical Conservation Practices (Ecological/NR) that Provide NR Benefits								
580	Streambank and Shoreline Protection	short-term	minor to moderate	long-term		short-term	minor to moderate	long-term
410	Grade Stabilization Structure	short-term	minor to moderate	long-term		short-term	minor to moderate	long-term
666	Forest Stand Improvement	short-term	minor	long-term		short-term	minor	-long-term
Conservation Practices (Soils and Water Conservation/NR)- that provide NR Benefits								
412	Grassed Waterway	short-term	minor	long-term		-	-	-
578	Stream Crossing	short-term	minor	-		-	-	-
600	Terrace	short-term	minor	long-term		-	-	-

Conservation Practices (Ecological/NR)

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. Areas would be replanted with native vegetation and or seeded to prevent erosion after bank regrading. Erosion control plans would be implemented during and after construction. Impacts would be applicable to Alternative A and Alternative B.

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. Areas would be replanted or seeded to prevent erosion after bank regrading. Erosion control plans would be implemented during and after construction. Impacts would be applicable to Alternative A and Alternative B.

Forest Stand Improvement (666): There would be short-term, minor 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. Impacts would be applicable to Alternative A and Alternative B.

Conservation Practices (Soil and Water Conservation/NR)

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. The grassed waterway practice would be done primarily on cropland as part of Alternative A; impacts would not be applicable to Alternative B.

Stream Crossing (578): There would be short-term, minor 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. This practice would be done primarily on pastureland/grassland as part of Alternative A; impacts would not be applicable to Alternative B.

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. The majority of these would be installed in agricultural fields and would not impact wildlife habitat. Areas not in crop production would be replanted or seeded to prevent erosion after bank regrading. Erosion control plans would be implemented during and after construction. This practice would be done primarily on cropland as part of Alternative A; impacts would not be applicable to Alternative B.

Best Practices

The MS TIG would consider best practices referenced in Section 6.15 and Appendix 6A of the PDARP/PEIS. Additional best practices may be recommended for site-specific conservation practices in different locations due to differences in relevant conditions. The following best practices are contemplated and would be implemented to the extent practicable in order to avoid and minimize impacts to habitats, wildlife, and to reduce the spread of invasive species:

- Conservation practices would use natural material in any conservation practice that advises the use of materials and native plantings and seedlings, as well as natural revegetation. The footprint of any disturbance would be minimized the extent practicable. Clearing activities would be discouraged in forested wetlands.

- All equipment to be used during the project, including personal gear, would be inspected and cleaned such that there is no observable presence of mud, seeds, vegetation, insects and other species.

No Action Alternative
Under the No Action Alternative, the MS TIG would not implement any projects for the NR (Nonpoint Source) Restoration Type at this time, and would instead allow natural recovery processes to occur (outcomes described in Section 3.8). When compared to Alternatives A and B, the No Action Alternative would not provide the benefits to habitats and wildlife that would be provided by the implementation of various conservation practices. 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 would occur through the action alternatives.

3.9.1.3.2 Protected Species

Affected Environment
The USFWS and NOAA NMFS designates (lists) species as threatened or endangered when they meet criteria detailed under the Endangered Species Act (ESA) of 1973, as amended (16 U.S.C. § 1531 *et seq*.). Additionally, MDWFP identifies and lists species for protection. Section 7(a)(2) of the ESA requires that each federal agency ensure that any action authorized, funded, or carried out by the agency is not likely to jeopardize the continued existence of any endangered or threatened species or result in the destruction or adverse modification of Critical Habitat of those species. When the action of a federal agency, either by activity, permitting, or funding, may affect a protected species or its Critical Habitat, that agency is required to consult with either the NMFS or the USFWS, depending on which agency has jurisdiction over the protected species that may be affected.

To fulfill requirements and obligations under the ESA, the MMPA, the MBTA and the BGEPA, the MS TIG completed and submitted Biological Evaluation Forms to NOAA and USFWS. The USFWS Ecological Services Field Office, Jackson, MS concurred by letter dated April 5, 2017 that the Upper Pascagoula Water Quality Enhancement project may affect but is not likely to adversely affect listed species in the project area and that appropriate avoidance and minimization measures have been included within the project description to ensure that any effects to the Northern long-eared bat, red-cockaded woodpecker, gopher tortoise, yellow-blotched map turtle, wood stork, pearl darter, and Gulf sturgeon are insignificant or discountable. The USFWS also noted that neither price's potato bean nor the ringed map turtle are expected to occur within the vicinity of the project. By memorandum dated March 29, 2017, the NOAA Restoration Center, Southeast Region determined that the proposed project will not affect Essential Fish Habitat (EFH) because there is no EFH in the project area or EFH will not be affected by proposed actions. By memorandum dated March 29, 2017, the NOAA Restoration Center, Southeast Region determined that the proposed project will have no effect on listed species under the jurisdiction of NMFS. The MS TIG coordinated with the USFWS and NOAA NMFS to determine that this project does not require authorization under the MMPA. Compliance with the ESA, MBTA and the BGEPA are discussed further below. The ESA conservation measures that will apply to the conservation practices implemented under the Upper Pascagoula Water Quality Enhancement project to avoid adverse impacts to the threatened and endangered species potentially present in each county are listed at the end of this section.

Federally protected species that are known to occur or could occur in Newton, Lauderdale, Clarke, Neshoba, and Kemper counties are listed in Table 3.9-11.

Table 3.9-11: Federally threatened, endangered, and proposed species.

Common Name	Scientific Name	Federal Status	County	Habitat
Birds				
Red-cockaded woodpecker	*Picoides borealis*	Endangered	Newton	This species excavates nesting and roosting cavities in living pine trees, and is the only species known to do so exclusively. Cavities have been found in most species of southern pines, but longleaf pine appears to be the preferred species. Older, mature trees are selected for cavity excavation.
Wood stork	*Mycteria Americana*	Threatened	All	Freshwater and estuarine wetlands, primarily nesting in cypress or mangrove swamps. They feed in freshwater marshes, narrow tidal creeks, or flooded tidal pools. Particularly attractive feeding sites are depressions in marshes or swamps where fish become concentrated during periods of falling water levels.
Fishes[68]				
Gulf sturgeon	*Acipenser oxyrinchus desotoi*	Threatened	Clarke	Migrates from large freshwater coastal rivers to brackish and marine coastal bays, estuaries and the Gulf of Mexico.
Mammals				
Northern long-eared bat	*Myotis septentrionalis*	Threatened	Kemper, Lauderdale, Neshoba, Newton	During the summer, northern long-eared bats roost singly or in colonies underneath bark, in cavities or in crevices of both live trees and snags (dead trees). Northern long-eared bats spend winter hibernating in caves and mines, called hibernacula.
Reptiles				
Ringed map turtle	*Graptemys oculifera*	Threatened	Neshoba	The threatened ringed map turtle is found in the Pearl River. It prefers river stretches with moderate currents, abundant basking sites, and sand bars for nesting. The USFWS indicated in its ESA consultation concurrence letter that the ringed map turtle is not known or expected to occur within the vicinity of the proposed project.

[68] In addition to the Gulf Sturgeon, the MS TIG and USFWS considered the effects of the Upper Pascagoula Water Quality Enhancement project on the pearl darter, a small species of fish in the Pascagoula River system that is a candidate for ESA listing.

Common Name	Scientific Name	Federal Status	County	Habitat
Gopher tortoise	*Gopherus Polyphemus*	Threatened	Clarke	Well-drained, sandy soils, which allow easy burrowing; an abundance of diverse herbaceous ground cover; and an open canopy and sparse shrub cover, which allows sunlight to reach the ground floor (USFWS 2013).
Yellow-blotched map turtle	*Graptemys flavimaculata*	Threatened	Clarke	Habitat is streams with strong, consistent current and large sandbars for nesting.
Plants				
Price's potato bean	*Apios priceana*	Threatened	Kemper	This species found on slopes or bluffs with open woods that often grade into creek and river bottoms. The species may also be found along forested margins of power-line and road rights-of-ways. The USFWS indicated in its ESA consultation concurrence letter that Price's potato bean is not known or expected to occur within the vicinity of the proposed project.

Birds

Wood Stork (*Mycteria americana Linnaeus*): In Mississippi, wood storks have been observed most frequently along the western edge of the state in those counties bordering the Mississippi River and with increasing frequency in some counties along the eastern edge of the state, although they may occur almost anywhere there are sloughs or swamps to provide feeding habitat. The wood stork occurs primarily in freshwater wetlands, including ponds, bayheads, flooded pastures, oxbow lakes, and ditches. This species only occurs seasonally in Mississippi during the non-breeding season (May-October). In the project area wood stork may use habitat for foraging and loafing. Typical foraging sites include freshwater marshes, swales, ponds, hardwood and cypress swamps, narrow tidal creeks or shallow tidal pools, and artificial wetlands (such as stock ponds; shallow, seasonally flooded roadside or agricultural ditches; and impoundments). The USFWS has concurred that by incorporating the ESA conservation measures below, the conservation practices to be implemented under the preferred action may affect but are not likely to adversely affect Wood Storks.

Red-cockaded Woodpecker (*Picoides borealis*): In Mississippi, this species has been recorded primarily in the southern two-thirds of the state. It has not been found in the Delta and only sporadically occurs in the northern counties. The red-cockaded woodpecker is a species of southern pine forests. The preferred nesting habitat is open, park-like, mature pine woodlands with few or no hardwood trees present. Preferred feeding habitats are pine stands with trees 23 cm (9 in.) and greater in diameter. These may or may not include a significant hardwood component. The red-cockaded woodpecker excavates nesting and roosting cavities in mature pine trees (60+ years old), and is the only species known to do so exclusively. Cavities have been found in most species of southern pines, but longleaf pine (*Pinus palustris*) appears to be the preferred species. (MS Museum of Natural Science 2014). All cavity trees, active and inactive, are important to the colony and should therefore be avoided. Also, older (30+ years) pine stands within a half-mile of a colony should be considered foraging habitats and should not be disturbed. The USFWS has concurred that by incorporating the measures identified in the ESA conservation measures below, the conservation practices to be implemented under the preferred action may affect but are not likely to adversely affect red-cockaded woodpeckers.

Fishes

Gulf Sturgeon (*Acipenser oxyrinchus desotoi*): In the Pascagoula River watershed, the Gulf sturgeon occurs in the Chickasawhay River upstream to at least the town of Waynesboro (MS Museum of Natural Science 2014). Waynesboro is approximately 34 miles south of the southern extent of the proposed alternatives. However, because of the beneficial effects on water quality and indirectly Gulf sturgeon, as well as incorporation of aquatic measures identified in the ESA conservation measures below, the USFWS concurred that the conservation practices to be implemented under the preferred action may affect but are not likely to adversely affect Gulf sturgeon.

Pearl Darter (*Percina aurora*): This small species of fish is a candidate species historically found in the Pearl and Pascagoula River systems, but is currently found only in the Pascagoula River system. The darter prefers stable gravel riffles or sandstone exposures with large sized gravel or rock. Though the species is not currently protected under the ESA, this project will contribute to improved water quality, potentially contributing to the recovery of the species and the MS TIG has agreed to implement the aquatic measures identified in the ESA conservation measures below, to avoid potential for adverse effects to the pearl darter.

Mammals

Northern Long-eared Bat (*Myotis septentrionalis*): Northern long-eared bats typically hibernate in caves but may exist in forested areas where there are snags or under exfoliating bark, cracks, or crevices in trees. They enter hibernation sometime between September and November and emerge during the spring between March and May depending on latitude. The species typically does not hibernate as a single species, but with large numbers of other bats of varying species. The species frequents forest interiors and consumes a diet consisting predominantly of moths, beetles, and flies. They forage both under forest canopy and along forest edges primarily during the first two hours after sunset. Mating occurs between July and October, with births taking place between May and July (MSU 2016). There are currently no known maternity roost trees in the State of Mississippi and one hibernaculum located outside the proposed project area. The USFWS has concurred that by incorporating the northern long-eared bat measures identified in ESA conservation measures below, the conservation practices to be implemented under the preferred action may affect but are not likely to adversely affect northern long-eared bats.

Reptiles

Gopher Tortoise (*Gopherus polyphemus*): The gopher tortoise uses well-drained to excessively well-drained upland soils. Tortoises require soils that are sandy enough to permit construction of burrows and open canopies that allow sufficient herbaceous plant growth and sunny areas in which to nest. In Mississippi, these areas often support a mixture of longleaf pine and scrub oaks. The USFWS has concurred that by incorporating the gopher tortoise measures identified in the ESA conservation measures below, the conservation practices to be implemented under the preferred action may affect but are not likely to adversely affect gopher tortoises.

Ringed Map Turtle (*Graptemys oculifera*): This turtle prefers river stretches with moderate currents, abundant basking sites, and sand bars for nesting. It turtle occurs only in the Pearl River and its tributary, the Bogue Chitto River (MS Museum of Natural Science 2014). The USFWS indicated in its ESA concurrence letter that the ringed map turtle is not known or expected to occur within the vicinity of the proposed project and concurs that by incorporating the aquatic measures identified in the ESA conservation measures below, the conservation practices to be implemented under the preferred action may affect but are not likely to adversely affect ringed map turtles.

Yellow-blotched Map Turtle (*Graptemys flavimaculata*): A Mississippi endemic, the yellow-blotched map turtle occurs in the Pascagoula, Chickasawhay, Leaf, Bouie, and Escatawpa rivers and in Tallahala, Black, Bluff, Bogue Homa, Buckatunna, Gaines, Okatoma, and Thompson's creeks. This turtle occurs in the Pascagoula River from Jackson County upriver to the confluence of the Leaf and Chickasawhay rivers in George County. It is sporadically distributed up the Leaf River to Covington County and as far upstream as Clarke County in the Chickasawhay River. The largest and most viable population appears to occur in the lower Pascagoula River from the town of Wade downstream to the beginning of the brackish marshes at the mouth of the Pascagoula River. The yellow-blotched map turtle requires streams with strong, consistent current and large sandbars for nesting. It spends much of the day basking, so it needs streams which are wide enough to receive several hours of direct sunlight per day and which have abundant snags and logs on which to bask. This habitat type is most often found in the rivers and larger creeks within its range, but may also be found in bends of medium-sized (15 -30 m wide) creeks. (MS Museum of Natural Science 2014). The USFWS has concurred that by incorporating the aquatic measures identified in the ESA conservation measures below, the conservation practices to be implemented under the preferred action may affect but are not likely to adversely affect yellow-blotched map turtles.

Plants

Price's Potato Bean (*Apios priceana*): In Mississippi, populations have been found in Oktibbeha, Lee, and Kemper counties. Historically, this species has been found in Clay County, and new populations may still be found there, as well as in Chickasaw, Pontotoc and Benton counties. Populations occur in open woods and along woodland edges in limestone areas, often where bluffs grade into creek or river bottoms. Several populations extend onto roadside or powerline rights-of-way. The soils are described as well-drained loams on old alluvium or over limestone. Plant associates in Mississippi's populations include chinkapin oak, white ash, basswood, sugar maple, slippery elm, redbud, spicebush, and switchcane. This species is thought to be a native of forest openings and thrives best in areas with partial canopy. Price's potato bean flowers from late June through July and produces fruit in August. The USFWS indicated in its ESA concurrence letter that price's potato bean is not known or expected to occur within the vicinity of the proposed project and concurs that by incorporating the measures identified in ESA conservation measures below, the conservation practices to be implemented under the preferred action may affect but are not likely to adversely affect price's potato bean.

Environmental Consequences for NR (Nonpoint Source) Proposed Alternatives A (Preferred) and B

As stated above, the MS TIG conducted programmatic ESA consultations with the USFWS regarding the effects of the Upper Pascagoula Water Quality Enhancement project on protected species and agreed to follow the specific conservation measures identified below. NMFS concurred there would be no effect on marine species or designated critical habitat and USFWS concurred there would be no effect on designated critical habitat of species under their jurisdiction. Potential impacts to threatened or endangered species are presented in Table 3.9-12.

Table 3.9-12: Protected Species Impacts.

Species /Critical Habitat	Applicable Habitats	Example Conservation Practices for Applicable Habitats	Potential Impacts to Species/Critical Habitat
Red-cockaded woodpecker (*Picoides borealis*)	Forest	• Forest Stand Improvement (666) • Streambank and Shoreline Protection (580)	This species may use this habitat for foraging, loafing, and nesting. Activities would be planned so as to avoid disturbing the species or its habitat. The ESA conservation measures below identify the measures that will be used when implementing actions in Red-cockaded woodpecker habitat.
Wood stork (Mycteria americana)	Forest	• Forest Stand Improvement (666) • Streambank and Shoreline Protection (580)	Wood stork may use this habitat for foraging and loafing. The species does not nest in the project area for proposed alternatives. The species would be able to vacate the area during conservation practice implementation, and return after completion.
Gulf sturgeon (Acipenser oxyrinchus desotoi)	Not known to be located in proposed project area	n/a	This species is a primitive, anadromous fish that annually migrate from the Gulf of Mexico into freshwater streams to spawn. Subadults and adults spend eight to nine months each year in rivers. Adult and subadult holding areas have been identified in the Pascagoula River though not as far north as the project area. Measures for aquatic species will nonetheless be applied as appropriate.
Northern long-eared bat (*Myotis septentrionalis*)	Forest	• Forest Stand Improvement (666) • Streambank and Shoreline Protection (580)	This species may exist in forested areas where there are snags or under exfoliating bark, cracks, or crevices in trees. If habitat exists in the area, measures identified in the ESA conservation measures below for the Northern long-eared bat will be applied to avoid adverse effects.
Ringed map turtle (*Graptemys oculifera*)	Water	• Stream Crossing (578) • Streambank and Shoreline Protection (580)	During the consultation process, USFWS stated that this species is not expected to occur in the vicinity of the project (USFWS 2017d) but aquatic measures will nonetheless be applied as appropriate.
Gopher tortoise (Gopherus polyphemus)	• Habitat will not likely be present in proposed project area • Forest • Grassland	• Forest Stand Improvement (666)	If suitable habitat is present at the location of a selected conservation practice, conservation practices would be designed using the appropriate Gopher tortoise measures in the ESA conservation measures below so as to minimize the effects to the species.
Yellow-blotched map turtle (*Graptemys flavimaculata*)	Water	• Stream Crossing (578) • Streambank and Shoreline Protection (580)	Conservation practices could result in a noise impact and habitat disturbance causing the species to temporarily vacate the area. If potential habitat is found, the conservation practice would be designed using the aquatic measures in the ESA conservation measures below so as to avoid and minimize the effects to the species.

Species /Critical Habitat	Applicable Habitats	Example Conservation Practices for Applicable Habitats	Potential Impacts to Species/Critical Habitat
Price's potato bean (*Apios priceana*)	• Forest • Grassland	• Forest Stand Improvement (666) • Grassed Waterway (412)	During the consultation process, USFWS stated that this species is not expected to occur in the vicinity of the project (USFWS 2017d). Nonetheless, measures identified in the ESA conservation measures below will be used when appropriate.

ESA Conservation Measures

The MS TIG has received confirmation that by applying the conservation measures identified below, the NRCS conservation practices to be implemented under the Upper Pascagoula Water Quality Improvement project may affect but are not likely to adversely affect ESA-protected species in the project area (USFWS 2017d). The MS TIG would continue to consult under ESA as appropriate if new species are listed or conditions are not as described in the consultation.

<u>Conservation measures applicable to the Upper Pascagoula Water Quality Enhancement project (USFWS 2017e)</u>

Wood Stork: No measures are required. Wood stork uses habitat primarily for non-breeding season loafing and foraging and can leave the area during construction and return.

Gulf sturgeon, Pearl darter, Yellow-blotched map turtle, and Ringed map turtle

- Contact NRCS point of contact (POC) for possible further consultation if installation and/or management of conservation practice will occur within 50 feet of a stream within a 12-digit HUC containing aquatic listed species, and one or more, as needed, of the following protective measures cannot be implemented. Protective measures when working near suitable habitat for listed aquatic species includes: no mechanized clearing within 50 feet of streams; installing BMP's such as vegetated buffers to prevent erosion and sedimentation into streams; fencing livestock out of streams; and minimizing stream crossing associated with forest trails and landings CPS 655.
- Contact NRCS POC for possible further consultation if instream work (e.g., snagging, channel realignment, bank armoring, dams, bridge pilings, culverts) is proposed within a 12-digit HUC with listed aquatic species. Protective measures include using appropriate BMP's to prevent erosion and sedimentation into streams; designing stream crossings to ensure that the natural flow and hydrology of the stream is maintained year-round; and preventing barriers to fish and other aquatic organism passage associated with instream work.
- Contact NRCS POC for possible further consultation if pesticides will be used within 100 feet of a stream (or 200 feet for aerial pesticide applications) within a 12-digit HUC containing aquatic listed species, and one or more, if needed, of the following protective measures cannot be implemented. Protective measures include using spot treatment techniques (e.g. hack and squirt, basal bark, cut stump and direct foliar spray), using selective herbicides that maintain native grasses, avoiding pesticide drift into non-targeted area by not spraying when wind speeds are over 10 mph, and avoiding runoff into non-target streams by applying during dry weather when rainfall is not expected within 24 hours. WINPEST evaluations will be

conducted to identify measures to prevent polluting surface and ground waters or affecting non-target species.

Gopher tortoise

- Heavy equipment (including mowers) will stay at least 4 meters (13 feet) from known gopher tortoise burrows. Contact Service biologist, State Wildlife Agency biologist, or NRCS state biologist if assistance is needed to conduct gopher tortoise surveys. This applies to all practices where heavy equipment is used. Heavy equipment is defined as agricultural tractors, crawler loaders, crawler dozer, backhoe/loader, front end loader, scraper pan, motor grader, skid steer, forklift (P.l.T.), hydraulic excavator, and specialty tracked equipment. Felling of trees and brush, cutting by hand, hack and squirt, backpack application, or use of herbicide pellets is allowed within this buffer.
- Design all practices to minimize or avoid unintentional damage to non-target plants. This applies to all practices where vegetation is managed such as the use of herbicides or site prep/harvest equipment.
- Native species shall be used to meet practice objectives. Base native plant community restoration goals on ecological site descriptions or recommendations provided by the NRCS state biologist. Planning will include the provision of forbs, grasses and grass-like plants to meet gopher tortoise foraging needs, whether by planting or site management. Consult with the NRCS state biologist if planting of non-native species is required to meet the intent of the practice. Seed mixes must be free of state-declared noxious and invasive material.
- Stocking densities and species of trees/shrubs shall be consistent with gopher tortoise habitat needs - this varies by state. As recommended by each USDA State Technical Committee.
- Control of invasive species (CPS 314 & CPS 315) will occur to the extent practical for eradication. Control of non-invasive, undesirable species will be conducted on a "spot" or rotational basis to protect native grasses, forbs and legumes. Herbicides will be restricted to those having the least effect on the seed bank, but still providing control of undesirable plant competition. Herbicide application rates will be adjusted to account for the effects of soil texture (within label rate specifications - see NRCS job sheets for CPS 490, Tree and Shrub Site Preparation and CPS 666, Forest Sand Improvement). If greater than 25 acres/year of aerial spraying will occur, contact the NRCS state biologist for further assistance. After implementation, regular monitoring of the site must occur to ensure erosion and undesirable plant species concerns are addressed in a timely manner.
- There will be no root raking, woody debris piling, scalping, or shearing that removes the top layer of soil in Service-NRCS classified suitable soil areas. Site preparation will not include bedding (a mechanical means of site preparation that mounds soil in narrow strips for tree planting). Roller chopping will be limited to single pass with single roller. Avoid placement of logging slash within 4 meters (13 feet) of known gopher tortoise burrows.
- Bum on 2 to 3 year rotation unless weather prevents the safe use of prescribed fire. Growing season bums are encouraged to set back hardwoods and stimulate regeneration of native vegetation, such as wiregrass, Indian grass, bluestems, and forbs.
- If implementing CPS 528, Prescribed Grazing, maintain a minimum average native forage stubble height of 6 inches. This applies to all areas that are grazed.
- Fencing should be installed so as to allow for the safe passage of gopher tortoises. Contact NRCS state biologist for further assistance.

Northern long-eared bat (NLEB)

- No tree removal (i.e., trees over 3 inch diameter at breast height) during the summer roosting season (i.e., April 15-August 31) for projects within 150 feet of a known NLEB summer roost site. See the GIS HUC file for 12-difit HUCs with known NLEB roosts. Contact NRCS POC if trees must be removed during the summer roosting season.
- Include bat mitigation efforts (bat gates) for the closing of natural caves and/or abandoned mines that have evidence of bat use. Avoid disturbance (e.g. use of machinery, building of roads, and application of pesticides) of foraging areas near known bat caves by adhering to an activity buffer distance of 200-foot radius from the cave entrance. Maintain snags within 1/2 mile radius of cave entrances. See the GIS HUC file for 12-digit HUCs with known NLEB caves.
- Conduct prescribed burns and application of pesticides outside of the summer roosting season (i.e., April 15-August 31) for projects within 150 feet of a known NLEB summer roost site. See the GIS HUC file for 12-digit HUCs with known roosts. Spot treatment is preferred over aerial application.

Red-cockaded woodpecker: Contact NRCS POC if installation and/or management of conservation practice will convert, remove, damage, or degrade foraging habitat (i.e., southern yellow pine tree species greater than or equal to 10 inch DBH in a pine-dominated stand) or potential cavity trees (i.e., pine trees 60 years old or older) within 0.5 mile of an active cluster. See GIS HUC file for 12-digit HUCs with known or potential red-cockaded woodpecker clusters.

Price’s potato bean: Contact NRCS POC if installation and/or management of conservation practice will adversely affect (i.e., clear, thin, land mechanical treatment, herbicide use) suitable Price's potato bean habitat (i.e. forest openings in mixed hardwood stands on slopes or bluffs of alkaline soils that grade into creek or stream bottoms) within a 12-digit HUC containing potential Price’s potato bean habitat. Kudzu control using herbicides or mechanical treatment is acceptable (beneficial effect) within potential suitable Price’s potato bean habitat where populations are not currently present.

No Action Alternative
Under the No Action Alternative, the MS TIG would not implement any projects for the NR (Nonpoint Source) Restoration Type at this time, and would instead allow natural recovery processes to occur (outcomes described in Section 3.8). When compared to Alternatives A and B the No Action Alternative would not enhance habitat that protected species could utilize. 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 would occur through the action alternatives.

3.9.1.3.3 Migratory Birds

Affected Environment
The MBTA implements various treaties and conventions among the United States, Canada, Japan, Mexico, and the former Soviet Union for the protection of migratory birds. Under MBTA, unless permitted by regulations, it is unlawful to pursue, hunt, take, capture, kill, attempt to take, capture, or kill, possess, offer for sale, sell, offer to barter, barter, offer to purchase, purchase, deliver for shipment, ship, export, import, cause to be shipped, exported, or imported, deliver for transportion,

transport or cause to be transported, carry or cause to be carried, or received for shipment, transportation, carriage, or export, any migratory bird, part, nest, egg, or product, manufactured or not. USFWS regulations broadly define “take” under MBTA to mean “pursue, hunt, shoot, wound, kill, trap, capture, or collect, or attempt to pursue, hunt, shoot, wound, kill, trap, capture, or collect.”

Migratory bird species groups that could occur in the project area for the proposed alternatives include wading birds, raptors, goatsuckers, waterfowl, doves and pigeons, and rails and coots (see Table 3.9-13).

Table 3.9-13: Species Groups Present in Project Area for the Proposed Alternatives.

SPECIES	BEHAVIOR	SPECIES HABITAT
Wading birds (herons, egrets, ibises)	Foraging, feeding, resting, roosting, nesting	Wading birds primarily forage and feed at the water’s edge. There would be limited habitat in the project area for the proposed alternatives except for ponds and potential habitat that could occur in streams. These birds primarily nest and roost in trees or shrubs (e.g. pines, *Bacchurus*).
Raptors (osprey, hawks, eagles, owls)	Foraging, feeding, resting, roosting, nesting	Raptors forage, feed, rest and nest in the action area.
Goatsuckers	Foraging, feeding, resting, roosting, nesting	Goatsuckers forage, feed, rest, and roost in the action area. However, they are nocturnal/crepuscular and nest in thickets and woodlands.
Waterfowl (ducks, loons, and grebes)	Foraging, feeding, resting, roosting, nesting	Waterfowl forage, feed, rest, and roost in the action area. These birds primarily roost and nest in low vegetation. There would be limited if any habitat suitable for nesting waterfowl.
Doves and pigeons	Foraging, feeding, resting, roosting	Doves and pigeons could forage, feed, rest, and roost in the action area.
Rails and coots	Foraging, feeding, resting, roosting, nesting	Rails and coots forage, feed, rest, and roost in the action area. These birds primarily roost and nest in wetland areas, and in areas adjacent to streams where in-water restoration activities may be conducted.

The BGEPA prohibits anyone, without a permit issued by the Secretary of the Interior, from "taking" bald eagles, including their parts, nests, or eggs. BGEPA provides criminal penalties for persons who "take, possess, sell, purchase, barter, offer to sell, purchase or barter, transport, export or import, at any time or any manner, any bald eagle ... [or any golden eagle], alive or dead, or any part, nest, or egg thereof." Bald eagles are present in the project area for the proposed alternatives, but Golden eagles are not.

Environmental Consequences NR (Nonpoint Source) Proposed Alternatives A (Preferred) and B

Migratory birds could use areas at and around the proposed project area for foraging, feeding, resting, and nesting. Nesting species include raptors (forest edge near wet areas), wading birds (pine trees/shrubs adjacent to wet areas), and waterfowl (open water) (see Table 3.9-13). The MS TIG has completed (USFWS 2017c) coordination and review of the project alternatives for impacts to migratory birds and bald eagles in accordance with the MBTA and BGEPA to ensure appropriate conservation measures would be incorporated into the selected project alternative. The USFWS agrees that the project is not likely to result in a take (intentionally or unintentionally) of any migratory bird, nest or eggs because all NRCS conservation practices will be implemented following the best practices identified below.

Best Practices

The MS TIG would consider best practices referenced in Section 6.15 and Appendix 6A of the PDARP/PEIS. However, the following best practices, derived from informal consultation with the USFWS (USFWS 2017e), are specifically contemplated and would be implemented to the extent practicable in order to avoid and minimize impacts to migratory birds including bald eagles:

- All NRCS conservation practices will be implemented outside the primary nesting season for migratory birds in Mississippi, which is April 1 to August 15. For Bald Eagles, activities will be avoided within 660 feet of an active bald eagle nest between December 1 - June 30.
- If the practice requires permanent removal of vegetation or implementation during the nesting season, the vegetation will be removed only in the footprint of the impacted area prior to the primary nesting season of April 1 to August 15 to ensure no migratory birds will build nests or lay eggs prior to construction. This mitigation avoids adverse effects to nesting birds.
- Foraging and resting birds may temporarily be displaced during management activities, but are able to fly to another nearby location to continue foraging/feeding and resting. Roosting would not be affected because management activities would occur during daylight hours.

The following more specific measures to protect Bald Eagles were identified during coordination with USFWS in addition to those above, but the measures above are broader and encompass these:

- If bald eagle breeding or nesting behaviors are observed or a nest is discovered or known, have all activities avoid the nest by a minimum of 660 feet. If the nest is protected by a vegetated buffer where there is no line of sight to the nest, then the minimum avoidance distance is 330 feet. Maintain this avoidance distance from the onset of breeding/courtship behaviors until any eggs have hatched and eaglets have fledged (approximately 6 months).
- If a similar activity (such as driving on a roadway) is closer than 660 feet to a nest, maintain a distance buffer as close to the nest as the existing tolerated activity. If a vegetated buffer is present and there is no line of sight to the nest and a similar activity is closer than 330 feet to a nest, then maintain a distance buffer as close to the nest as the existing tolerated activity.
- In some instances, activities conducted within 660 feet of a nest may result in disturbance, particularly for the eagles occupying the Mississippi barrier islands. If an activity appears to cause initial disturbance, stop the activity and move all individuals and equipment away until the eagles are no longer displaying disturbance behaviors. Contact the USFWS's Migratory Bird Permit Office to determine how to avoid impacts or if a permit may be needed.

No Action Alternative

Under the No Action Alternative, the MS TIG would not implement any projects for the NR (Nonpoint Source) Restoration Type at this time, and would instead allow natural recovery processes to occur (outcomes described in Section 3.8). There would be no adverse impacts to migratory birds or bald and golden eagles under the No Action Alternative. 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 would occur through the action alternatives.

3.9.1.4 Socioeconomic Resources

Introduction to Affected Environment (Socioeconomic Environment): Socioeconomics and environmental justice, cultural resources, and public health and safety are discussed in this section. PDARP Section 3.2 is incorporated by reference here. The affected environment for the proposed alternatives socioeconomic resources is described in respective sections below.

Programmatic Review of Environmental Consequences (Socioeconomic Resources): Section 6.4.3.1.3 of the PDARP/PEIS describes the impacts to Socioeconomic Resources for the relevant restoration approaches and is incorporated by reference and briefly described here.

PDARP/PEIS consequences related to economic effects: Economic impacts resulting from the implementation of this restoration approach are dependent on site-specific conditions associated with a project proposed for implementation. Depending on the techniques employed, short-term benefits to the local economy could accrue through an increase in employment and associated spending in the project area during construction activities.

PDARP/PEIS consequences related to cultural resources: If cultural or historic resources are present, minor adverse impacts to the resource would be anticipated during construction activities.

As appropriate in a tiered analysis, the evaluation of the proposed alternative focuses on the specific resources with a potential to be affected. Infrastructure, land and marine management, tourism and recreation, fisheries and aquaculture, marine transportation and aesthetic and visual resources impacts for the proposed alternatives would be negligible to minor. To avoid redundant or unnecessary information, these resources are evaluated here.

Infrastructure: No publicly owned or maintained infrastructure would be created or impacted as a result of these proposed alternatives.

Land and Marine Management: The end result of these proposed alternatives would be voluntary implementation by private landowners of conservation practices planned and implemented under the guidance and oversight of USDA-NRCS on cropland, associated agriculture lands, pasture/grassland, forestland and riparian areas. The conservation practices are consistent with current farmstead uses and operation that otherwise would not have benefit of conservation planning and oversight. The conservation practices would constitute a benefit to land use for landowners who voluntarily participate in the program. There would be no adverse impacts to land management.

Tourism and Recreational Use: The proposed alternatives would be carried out by the voluntary application of practices by land owners on their own land. Private land is not subject to tourism and any recreational benefits associated with the implementation of conservation practices (e.g. wildlife habitat, stream stabilization), would primarily benefit participants. Implementation of either Alternative A or B would have negligible impacts, if any, on tourism and recreational use.

Fisheries and Aquaculture: Implementation of Alternative A or B could include streambank stabilization in ephemeral and intermittent tributaries. Monitoring would include in-water work near the site of implemented conservation practices. There would be no impact on a commercial fishery or aquaculture operation.

Marine Transportation: No marine in-water work is proposed.

Aesthetic and Visual Resources: Conservation practices would be implemented on cropland, associated agriculture lands, pasture/grassland, and forestland. Conservation practices would be consistent with current farming practices and would have a negligible effect on aesthetic and visual resources.

For the socioeconomic resources, the following are further analyzed in this section:

- Socioeconomics and Environmental Justice
- Cultural resources
- Public Health and Safety

3.9.1.4.1 Socioeconomics and Environmental Justice

Affected Environment

The affected environment for the proposed alternative includes portions of Newton, Lauderdale, Clarke, Neshoba, and Kemper counties. Population data for each county is shown in Table 3.9-14. From 2009-2013, median household income in Clarke County was $31,362, which was 20% lower than the median household income in the State of Mississippi ($39,464); the median household income in Kemper County was $29,003, 27% lower than the median household income in the State of Mississippi; the median household income in Lauderdale County was $36,203, 8% lower than the median household income in the State of Mississippi; the median household income in Neshoba County was $37,050, 6% lower than the median household income in the State of Mississippi; the median household income in Newton County was $39,190, <1% lower than the median household income in the State of Mississippi (U.S. Census Bureau, 2010-2014 American Community Survey 5-Year Estimates).

Table 3.9-14: Population data (http://www.census.gov/2010census/popmap/).

Topic	Mississippi		Clarke County		Kemper County		Lauderdale County		Neshoba County		Newton County	
2010 Total Population	2,967,297		16,732		10,456		80,261		29,9676		21,720	
White alone	1,754,684	59%	10,741	64%	3,689	35%	43,957	55%	17,974	61%	13,734	63%
Black or African American alone	1,098,385	37%	5,759	34%	6,288	60%	34,330	43%	6,207	21%	6,567	30%
Asian alone	25,742	<1%	29	<1%	10	<1%	580	1%	102	<1%	52	<1%
American Indian and Alaska Native alone	15,030	<1%	60	<1%	385	4%	178	<1%	4,815	16%	1,092	5%

Topic	Mississippi		Clarke County		Kemper County		Lauderdale County		Neshoba County		Newton County	
Native Hawaiian and Other Pacific Islander alone	1,187	<1%	1	<1%	0	0%	30	<1%	9	<1%	0	0%
Some Other Race alone	38,162	1.3%	43	<1%	8	<1%	520	1%	140	<1%	86	<1%
Two or More Races	34,107	1.1%	99	1%	76	1%	666	1%	429	1%	189	1%

Environmental Consequences NR (Nonpoint Source) Proposed Alternatives A (Preferred) and B

There would be long-term socioeconomic benefits to landowners who voluntarily participate in the program including program investments to improve cropland, pasture/grassland, associated agriculture lands, forestland and/or riparian areas; savings from practices that reduce erosion and the associated costs for maintaining eroded drainage ways, cost reduction resulting from nutrient management, improved production/yield from crops from the implementation of soil and water conservation practices, and increases in the farmstead value because of the capital investment in farmstead improvements. There would be no adverse impacts to socioeconomics from the implementation of proposed Alternative A or B. There would be no disproportionate impacts to low-income or minority populations as a result of either of the project alternatives, particularly in light of USDA-NRCS efforts to reach out to such populations.

No Action Alternative

Under the No Action Alternative, the MS TIG would not implement any projects for the NR (Nonpoint Source) Restoration Type at this time, and would instead allow natural recovery processes to occur (outcomes described in Section 3.8). The No Action Alternative would have no widespread impact or benefit to socioeconomics or environmental justice. Private landowners would not benefit from additional funds to improve their land. 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 would occur through the action alternatives.

3.9.1.4.2 Cultural Resources

Affected Environment

Cultural resources include historic properties listed in, or eligible for listing in the National Register of Historic Places (36 C.F.R. §60[a-d]). The National Historic Preservation Act of 1966 (NHPA), as amended and recodified (54 U.S.C. §300308), defines an historic property as "any prehistoric or historic district, site, building, structure, or object included on, or eligible for inclusion on the National Register [of Historic Places]." Under the statute and implementing regulations, historic properties include significant traditional religious and cultural properties important to Indian tribes. Historic properties include built resources (bridges, buildings, piers, etc.), archaeological sites, and Traditional Cultural Properties, which are significant for their association with practices or beliefs of a living community that are both fundamental to that community's history and a piece of the community’s cultural identity. Although often associated with Native American traditions, such properties also may be important for their significance to ethnic groups or communities. Historic properties also include submerged resources.

The MS TIG conducted a literature review under Section 106 of the NHPA using MDAH records to identify any historic properties located within the proposed project area and to evaluate whether the alternatives would affect any historic properties. The review included literature concerning previously recorded archaeological sites, historical standing structures, historic districts, historic churches, post offices, utilities and other resources that are potential National Register of Historic Places properties, National Register Districts and National Historic Landmarks. The preliminary review of the previously recorded archaeological sites revealed archaeological sites located within the vicinity of the proposed project area.

Environmental Consequences for NR (Nonpoint Source) Proposed Alternatives A (Preferred) and B
The NHPA charges the federal government with protecting the cultural heritage and resources of the nation. The selected project alternative would be implemented in accordance with all applicable laws and regulations concerning the protection of cultural and historic resources. 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.

No Action Alternative
Under the No Action Alternative, the MS TIG would not implement any projects for the NR (Nonpoint Source) Restoration Type at this time, and would instead allow natural recovery processes to occur (outcomes described in Section 3.8). There would be no adverse impact to cultural resources under the No Action. 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 would occur through the action alternatives.

3.9.1.4.3 Public Health and Safety

Affected Resources
The majority of the conservation practices would occur on associated agriculture lands, cropland, pasture/grassland, forestland or in riparian areas or streams. Safety requirements applicable to engineered practices would be followed. Poor water quality has the potential to adversely affect public health and safety and designated waterway uses. The State of Mississippi Water Quality Criteria for Intrastate, Interstate, and Coastal Waters classifies most of the waters in the watershed for “recreation” and “fish and wildlife” uses (MDEQ 2012).

Environmental Consequences for NR (Nonpoint Source) Proposed Alternatives A (Preferred) and B
There would be no adverse impact to public health and safety. The program is voluntary and would be completed on private land under the guidance of the USDA-NRCS. There would be beneficial impacts to water quality in the watershed, which reduces risks to public health and safety. In addition, appropriate safety measures would be followed during practice design and installation.

No Action Alternative
Under the No Action Alternative, the MS TIG would not implement any projects for the NR (Nonpoint Source) Restoration Type at this time, and would instead allow natural recovery processes to occur (outcomes described in Section 3.8). Existing public health and safety concerns associated with water quality would improve more slowly. 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 would occur through the action alternatives.

3.9.2 Site-specific NEPA Review for NR (Nonpoint Source) Proposed Alternatives A (Preferred) and B

This RP/EA analyzes the impacts of alternatives for the NR Restoration Type at a programmatic level. The exact parcels and the conservation practices to be implemented on those parcels are not known at this time. The environmental consequences are based on the USDA-NRCS analysis of conservation practice effects and their experience implementing those practices. This programmatic analysis identifies impacts to each of the resource categories based on the MS TIG's knowledge of the proposed project area. The MS TIG would follow the environmental evaluation process described in Section 3.7.2 to ensure compliance with NEPA and other environmental requirements as site-specific conservation practices are planned for either Alternative A or B.

3.10 Cumulative Impacts for NR (Nonpoint Source)

Section 6.6 and Appendix 6B of the PDARP/PEIS are incorporated by reference into the following cumulative impacts analysis including the methodologies for assessing cumulative impacts, identification of affected resources and the cumulative impacts scenario. This analysis considers the context of the affected environment of the proposed NR alternatives (X), when added to the impacts from applicable past, present and reasonably foreseeable future actions (Y), to understand the potential cumulative impacts to an affected resource (Z), or where the effects may interact and/or be additive, that is X + Y = Z. This analysis includes the alternatives evaluated for the NR Restoration Type in this RP/EA, which include:

- Alternative A (Preferred): Upper Pascagoula River Water Quality Enhancement
- Alternative B: Pascagoula River Basin Riparian Buffer Maintenance Plan
- No Action

3.10.1 Identification of Resources Affected

Section 3.9 provides an environmental consequences analysis for the following resources that would have minor to negligible effects, and based on their magnitude, with respect to context and intensity, would not contribute to cumulative impacts. These resources are excluded from this cumulative impacts analysis:

- Air Quality and Greenhouse Gas Emissions
- Noise
- Marine and Estuarine Fauna
- Infrastructure

- Land and Marine Management
- Tourism and Recreational Use
- Fisheries and Aquaculture
- Marine Transportation
- Aesthetics and Visual Resources

Of the resources listed above, most were determined to have impacts that would not contribute to cumulative impacts, based on their magnitude with respect to context and intensity, and are therefore excluded from this cumulative impacts analysis. In planning site-specific conservation practices, the Implementing Trustee would avoid and minimize impacts to protected species, cultural resources, migratory birds and Bald and Golden Eagles, and will follow the conditions associated with any Section 404 CWA permits or authorizations. There would be no disproportionate impacts to low-income or minority populations that would result from implementation of proposed alternatives. In the site-specific planning of conservation practices, 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. There would be no adverse impact to public health and safety considering the beneficial impacts to water quality and the adherence to safety measures in the implementation of conservation practices. For the reasons listed above, these resources categories (protected species, migratory birds, bald and golden eagles, socioeconomic and environmental justice, cultural resources, and public health and safety) would not contribute to cumulative adverse impacts and are also excluded from this cumulative impacts analysis. The following resources were analyzed in detail for cumulative environmental consequences that could result from implementation of the alternative.

- Geology and Substrates
- Hydrology and Water Quality
- Habitats and Wildlife

3.10.2 Cumulative Action Scenario

In order to effectively consider the potential cumulative impacts, the MS TIG identified local and site-specific past, current and reasonably foreseeable future actions which are considered relevant to identifying any cumulative impacts the alternatives may have on a local scale. These actions fall within the established spatial and temporal boundaries. For the purpose of this cumulative impacts analysis the spatial extent would be the same as the project location which includes portions of Newton, Lauderdale, Clarke, Neshoba, and Kemper counties, Mississippi (Figure 3.9.1). The cumulative impacts analysis depends on the availability of information and data about past, present and reasonably foreseeable future actions. For this RP/EA, the MS TIG identified USDA conservation program-funded conservation practices that had been completed in the recent past and are foreseeable and are summarized in Table 3.10-1. The cumulative effects for both Alternatives A and B would be the same with the exception that because there is a fixed amount of funding, Alternative A would result in a higher level of treatment on fewer locations than Alternative B, with Alternative B likely resulting in more linear miles of riparian buffers but a somewhat lower ability to eliminate nutrient and sediment runoff where it exceeds the buffer's filtering capacity.

Table 3.10-1: Description of past, present, and reasonably foreseeable future actions considered in the cumulative impact analysis.

Category/Projects	Project Description	Key Resource Areas with Potential for Cumulative Impacts
Historic USDA Conservation Program Practices 2010-2016 (Project Area)	USDA conservation programs in portions of Newton, Lauderdale, Clarke, Neshoba, and Kemper counties, Mississippi from 2010 to 2016	Short-term adverse impacts to: • Geology and Substrates • Hydrology and Water Quality • Habitat and Wildlife Benefits • Geology and Substrates • Hydrology and water quality • Habitat and Wildlife
Future EQIP-funded Conservation Practices 2017-2021 (USDA $1.0 M)	EQIP-funded conservation practices in portions of Newton, Lauderdale, Clarke, Neshoba, and Kemper counties, Mississippi from 2017 to 2021	Short-term adverse impacts to: • Geology and Substrates • Hydrology and Water Quality • Habitat and Wildlife Benefits • Geology and Substrates • Hydrology and water quality • Habitat and Wildlife

The following section describes the cumulative impacts of the alternatives being considered when combined with other past, present and reasonably foreseeable future actions which were identified above. In many situations, implementation of the alternatives would likely help reduce overall long-term adverse impacts by providing a certain level of offsetting benefits, especially when considered in concert with the numerous other present and reasonably foreseeable future actions in the area.

3.10.3 Cumulative impact analysis

Geology and Substrates

For implementation of the proposed NR (Nonpoint Source) Alternatives A and B, based on the analysis of representative conservation practices, there would be potential for short-term to long-term, minor to moderate, adverse impacts to soil from soil disturbing activities such as streambank and shoreline stabilization, construction of grassed waterways, installation of grade stabilization structures, stream crossings, construction of terraces, and associated activities. There would be long-term benefits to soil because once implemented, conservation practices would reduce nutrient runoff and sedimentation of drainageways and tributaries.

Historic USDA-NRCS conservation program-funded practices and future EQIP-funded conservation practices would result in similar adverse and beneficial effects, but these practices would have small localized adverse impacts normally occurring at different times. The application of conservation practices using a systems approach that includes associated and mitigating practices would also serve to avoid and minimize adverse effects.

When the proposed NR (Nonpoint Source) Alternatives A and B are analyzed in combination with other past present, and reasonably foreseeable future actions, short-term cumulative adverse impacts to geology and substrates would likely occur. The alternatives would not contribute substantially to cumulative adverse impacts. The alternatives, carried out in conjunction with other conservation practices, would also have the potential to result in some long-term beneficial cumulative impacts to geology and substrates.

Hydrology and Water Quality

For implementation of the proposed NR (Nonpoint Source) Alternatives A and B, based on the analysis of representative conservation practices with potential for adverse effects, there would be short-term to long-term, minor to moderate, adverse impacts to hydrology and water quality from soil disturbing activities such as streambank and shoreline stabilization, construction of grassed waterways, installation of grade stabilization structures, stream crossings, construction of terraces, and associated activities. Implementation of conservation practices could result in short-term, minor changes to hydrology and short-term sedimentation resulting from the implementation of practices. There would be long-term benefits to hydrology and water quality resulting from streambank and shoreline restoration, construction of grassed waterways, installation of grade stabilization and other conservation practices. Conservation practices would result in staged stormwater discharge, reduced nutrient runoff and sedimentation into drainageways and tributaries.

Historic USDA conservation program-funded conservation practices and future EQIP funded conservation practices would result in similar adverse and beneficial effects, but these practices would have small localized impacts normally occurring at different times.

When the proposed NR (Nonpoint Source) Alternatives A and B are analyzed in combination with other past present, and reasonably foreseeable future actions, short-term cumulative adverse impacts to hydrology and water quality would likely occur. The alternatives would not contribute substantially to cumulative adverse impacts. The alternatives, carried out in conjunction with other conservation practices, would also have the potential to result in some long-term beneficial cumulative impacts to hydrology and water quality.

Habitats and Wildlife

For implementation of the proposed NR (Nonpoint Source) Alternatives A and B, based on the analysis of representative conservation practices, there would be short-term to long-term, minor to moderate, adverse impacts to habitats and wildlife from soil disturbing activities such as streambank and shoreline stabilization, stream crossings, forest stand improvements and associated activities. Implementation of conservation practices would include removal of vegetation, small, localized habitat loss, and short-term disturbance to wildlife. There would be long-term benefits to habitats, wildlife, and biodiversity resulting from streambank and shoreline restoration, forest stand improvement, and other conservation practices that would be habitat enhancements and would result in benefits to wildlife.

Historic USDA-NRCS conservation program-funded practices and future EQIP-funded conservation practices would result in similar adverse and beneficial effects, but these practices would have small localized impacts normally occurring at different times.

When the proposed NR (Nonpoint Source) Alternatives A and B are analyzed in combination with other past present, and reasonably foreseeable future actions, short-term cumulative adverse impacts to habitats and wildlife would likely occur. The alternatives would not contribute substantially to cumulative adverse impacts. The alternatives, carried out in conjunction with other conservation practices, would also have the potential to result in some long-term beneficial cumulative impacts to habitats and wildlife.

3.11 Comparison of the Alternatives-NR (Nonpoint Source) Restoration Type

This section provides a comparison of the NEPA environmental consequences for the reasonable range of alternatives for the NR (Nonpoint Source) Restoration Type. The alternatives include two action alternatives as well as a No Action alternative and are described in Table 3.11-1.

Table 3.11-1: Comparison of the NR (Nonpoint Source) Restoration Type Alternatives.

Alternatives	Comparison of the NR (Nonpoint Source) Restoration Type Alternatives
Alternative A (Preferred):	**Upper Pascagoula River Water Quality Enhancement Project** Alternative A would provide the opportunity to implement Ecological/NR conservation practices as well as Soil and Water conservation practices with willing participants, allowing for a wide array of benefits on cropland, pasture/grassland, associated agriculture lands and forestland. Under this alternative, fewer farms likely would be treated than under Alternative B because both upland and riparian area resource issues would be addressed on each farm under Alternative B which addresses only riparian areas.
Alternative B:	**Pascagoula River Basin Riparian Buffer Maintenance Plan** Alternative B differs from Alternative A only in that the range of conservation practices would be limited to Ecological/NR practices applied in riparian areas within associated agriculture lands and forestland. Funds allocated to this alternative likely would be spread across more landowners because only resource concerns within the riparian area would be addressed, resulting in fewer practices being installed per farm. Treatments under this alternative may not prevent runoff of all nutrients and sediments where applied in areas that buffers don't have the capacity to filter it all.
No Action Alternative:	Under the No Action Alternative, the MS TIG would not implement any projects for the NR (Nonpoint Source) Restoration Type at this time, and would instead allow natural recovery processes to occur, which could result in one of four outcomes for injured resources: 1) gradual recovery, 2) partial recovery, 3) no recovery, or 4) further deterioration. Although injured resources could presumably recover to or near baseline conditions under this scenario, recovery would take much longer compared to a scenario in which restoration actions were undertaken.
Physical Environment	
Alternative A (Preferred):	Based on the analysis of representative conservation practices there would be short-term to long-term, minor to moderate, adverse impacts to soil, hydrology and water quality. There would be short-term, minor to moderate, adverse impacts to wetlands. There would be long-term benefits to soil, hydrology, water quality and wetlands.
Alternative B:	Adverse and beneficial impacts would be the same for Alternative B as Alternative A but would be restricted to riparian areas within associated agriculture lands and forestland.
No Action Alternative:	This alternative is not expected to contribute to short-term, long term, indirect or cumulative adverse impacts to physical resources. The No Action Alternative would have no beneficial impacts to water quality through NR.
Biological Environment	
Alternative A (Preferred):	Based on the analysis of representative conservation practices there would be short-term to long-term, minor to moderate, adverse impacts to habitat and wildlife. There would be long-term benefits to habitat, wildlife, and biodiversity. The following federally protected species could be present within the proposed alternative project area: red-cockaded woodpecker, wood stork, northern long-eared bat; gopher tortoise, yellow-blotched map turtle, ringed map turtle, Gulf sturgeon, Price's potato bean, and pearl darter. The MS

Alternatives	Comparison of the NR (Nonpoint Source) Restoration Type Alternatives
	TIG has consulted with the USFWS Ecological Services Field Office in Jackson, Mississippi and received their concurrence that when using identified conservation measures, the conservation practices implemented under the Upper Pascagoula Water Quality Enhancement project may affect but are not likely to adversely affect ESA-protected species in the project area. Migratory bird species groups that could occur in the proposed alternative project area include wading birds, raptors, goatsuckers, waterfowl, doves and pigeons, and rails and coots. For all NRCS conservation practices, implementation will be outside the primary nesting season for migratory birds in Mississippi, which is April 1 to August 15. For Bald Eagles, activities will be avoided within 660 feet of an active bald eagle nest between Dec. 1 - June 30. If the practice requires permanent removal of vegetation or implementation during the nesting season, the vegetation will be removed only in the footprint of the impacted area prior to the primary nesting season - April 1 to August 15 to ensure no migratory birds will build nests or lay eggs prior to construction. This mitigation avoids adverse effects to nesting birds. Foraging and resting birds may temporarily be displaced during management activities, but are able to fly to another nearby location to continue foraging/feeding and resting. Roosting would not be affected because management activities would occur during daylight hours.
Alternative B:	Adverse and beneficial impacts would be the same for Alternative B as Alternative A but would be restricted to riparian areas within associated agriculture lands and forestland.
No Action Alternative:	This alternative is not expected to contribute to short-term, long term, indirect or cumulative adverse impacts to biological resources. The No Action Alternative would provide no beneficial impacts, because existing conditions would not change in a predictable way.
Socioeconomic Environment	
Alternative A (Preferred):	There would be no disproportionate impacts to low-income or minority populations that would result from implementation of proposed Alternative A. 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. There would be no adverse impact to public health and safety. There would be beneficial impacts to water quality in the watershed. Improved water quality is beneficial to public health since the waters in the watershed are mostly classified as “recreation” and “fish and wildlife” by the State of Mississippi Water Quality Criteria for Intrastate, Interstate, and Coastal Waters (MDEQ 2012).
Alternative B:	Adverse and beneficial impacts would be the same for Alternative B as Alternative A but would be restricted to riparian areas within associated agriculture lands and forestland.
No Action Alternative	This alternative is not expected to contribute to short-term, long term, indirect, or cumulative adverse impacts to socioeconomics. The No Action Alternative would provide no beneficial impacts, because existing conditions would not change in a predictable way.
Cumulative Effects	

Alternatives	Comparison of the NR (Nonpoint Source) Restoration Type Alternatives
Alternative A (Preferred) and B:	Alternative A would result in short-term adverse impacts to geology and substrates but because they are temporary would not contribute substantially to cumulative adverse impacts. Alternative A has potential to result in long-term beneficial impacts to geology and substrates. There would be minor short-term adverse impacts to water quality but there also would be long-term beneficial effects to hydrology and water quality. There would be short-term to long-term, minor to moderate, adverse impacts to habitats and wildlife from soil disturbing activities. Carried out with other past, present, and reasonably foreseeable future actions, long-term cumulative adverse impacts to geology and substrates, water quality, habitats and wildlife would not contribute substantially to cumulative adverse impacts. The alternatives, carried out in conjunction with other restoration efforts, would also have the potential to result in some long-term beneficial effects to geology and substrates, hydrology, and water quality. The cumulative effects for both Alternatives A and B will be the same with the exception that Alternative A is likely to result in a higher level of treatment on fewer farms than Alternative B, and Alternative B is more likely to result in more linear miles of riparian buffers but a somewhat lower ability to eliminate nutrient and sediment runoff where it exceeds the buffer's filtering capacity.
No Action Alternative	There would be no beneficial impacts or short or long-term cumulative adverse impacts to resources.

Subsequent environmental review would occur in addition to this programmatic review to determine whether planned actions are at or below the maximum adverse impacts described in this RP/EA. A copy of the Environmental Evaluation Worksheet to be used to document the results of the environmental evaluation is in Appendix A. If the planned action is likely to exceed the maximum adverse impacts described in this RP/EA, the MS TIG would undertake additional environmental review consistent with NEPA requirements and other requirements for protection of the environment or would abandon the planned project. The MS TIG does not propose to take actions that would result in any significant adverse impacts on the environment.

4.0 Compliance with Other Laws and Regulations

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

Federal environmental compliance responsibilities and procedures will follow the Trustee Council Standard Operating Procedures for Implementation of the Natural Resource Restoration for the Deepwater Horizon (*DWH*) Oil Spill, which are laid out in Section 9.4.6 of that document. Following these standard operating procedures, the Implementing Trustee for each project will ensure that the status of environmental compliance (e.g., completed versus in progress) is tracked through the Restoration Portal. Implementing Trustees will keep a record of compliance documents (e.g., ESA biological opinions, USACE permits) and ensure that they are submitted for inclusion to the Administrative Record. The MS TIG will ensure compliance with all applicable laws and regulations.

4.1 Additional Federal Laws

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

- Endangered Species Act
- Magnuson-Stevens Fishery Conservation and Management Act
- Marine Mammal Protection Act
- Coastal Zone Management Act
- National Historic Preservation Act
- Coastal Barrier Resources Act
- Migratory Bird Treaty Act
- Bald and Golden Eagle Protection Act
- Clean Air Act
- Clean Water Act
- Rivers and Harbors Act
- Marine Protection, Research and Sanctuaries Act
- Estuary Protection Act
- Archaeological Resource Protection Act
- National Marine Sanctuaries Act
- Farmland Protection Policy Act
- Private Aids to Navigation (C.F.R. Title 33, Chapter 1, Part 66)
- Federal Water Pollution Control Act
- Additional Executive Orders
    - EO 11988: Floodplain Management
    - EO 11990: Protection of Wetlands
    - EO 12898: Environmental Justice

- EO 12962: Recreational Fisheries
- EO 13112: Invasive Species
- EO 13175: Consultation and Coordination with Indian Tribal Governments
- EO 13186: Responsibilities of Federal Agencies to Protect Migratory Birds
- EO 13693: Planning for Federal Sustainability in the Next Decade

4.2 Additional State Laws

Potentially applicable state laws may include but are not limited to:

- Public Trust Tidelands, Miss. Code Ann. §29-1-1 *et seq*.
- Antiquities Law of Mississippi, Miss. Code Ann. §39-7-1 *et seq*.
- Mississippi Air and Water Pollution Control Law, Miss Code Ann. § 49-17-1 *et seq*.
- Coastal Wetlands Protection Act, Miss. Code Ann. § 49-27-1 *et seq*.
- Marine Resources, Miss. Code Ann. 57-15-1 *et seq*.

5.0 Monitoring and Adaptive Management Plan

5.1 Introduction

Monitoring, Adaptive Management, and Administrative Oversight was identified as one of the Programmatic Trustee Goals for restoration in the PDARP/PEIS. As described in Chapter 5, Appendix 5.E of the PDARP/PEIS, the Trustee Council has committed to a Monitoring and Adaptive Management (MAM) Framework to support restoration activities by infusing best available science into project planning and design, identifying and reducing key uncertainties, tracking and evaluating progress toward restoration goals, determining the need for corrective actions, and supporting compliance monitoring.

The *DWH* NRDA MAM Framework provides a flexible, science-based approach to effectively and efficiently implement restoration over several decades that provides long-term benefits to the resources and services injured by the *DWH* Oil Spill. MAM plans identify the monitoring needed to evaluate progress toward meeting site-specific objectives and to support adaptive management of the restoration project.

The MAM plans for the three preferred project alternatives are attached as Appendix D, E and F of this RP/EA. MAM Plans are living documents and they will be updated as needed to reflect changing conditions and/or to incorporate new information. For example, the plan may need to be revised if the project design changes, if initial data analysis indicates that the sampling design is inadequate, or if any uncertainties are resolved or new uncertainties are identified during project implementation and monitoring. Any future revisions to these documents will be made publicly available through the Restoration Portal by the web links provided here. Full monitoring plans for each project can also be accessed through the web link.

5.2 Summary of Restoration Goals, Objectives, and Performance Criteria

Proposed Project Alternative: Graveline Bay Land Acquisition and Management
Restoration activities include acquisition of up to 1,410 acres of habitat in the vicinity of the Graveline Bay CP and restoration and management activities in the existing and expanded Graveline Bay CP. Management activities would include access restriction, chemical treatment, mechanical treatment, prescribed fire, debris removal and road repair/culvert placement. This project is intended to restore habitats and resources injured from the *DWH* Oil Spill, including foraging habitat for multiple bird species. Additional ecosystem services that are provided include preservation of buffer habitat for coastal marsh to promote long-term health of coastal habitats and the species that inhabit and utilize the habitat for reproduction, foraging, and shelter. The lead Implementing Trustee for the project would be MDEQ working with DOI as an Implementing Trustee. DOI will also be the lead federal agency for conducting the environmental evaluation review for implementation. Trustee roles and responsibilities will be defined in accordance with the SOPs. MDMR would be a project partner.

The MAM Plan for the Graveline Bay Land Acquisition and Management proposed alternative is included as Appendix D of this RP/EA. A summary of goals and objectives are provided here.

Goal 1: Restore and Conserve Habitat

Objectives

- Protect estuarine marsh, shoreline (beach) and other coastal riparian habitats from development and increase habitat connectivity to other large conservation parcels, by acquiring priority lands in the Graveline Bay CP for conservation.
- Increase and maintain native vegetation species composition in restored habitats within Graveline Bay CP.

a. Performance Criteria: Acquisition
    i. Fee-simple acquisition of priority habitats in the project area of 1,410 acres
b. Performance Criteria: Management
    i. Vegetation structure for fire-suppressed pine savanna (by year 5)
        - 20–65% canopy cover of longleaf or slash pine
        - 40–100% herbaceous cover
        - Invasive nonnative plant species in any stratum present but sporadic (1–5 % cover)
    ii. Vegetation Composition
        - 95% native flora

Goal 2: Replenish and Protect Living Coastal and Marine Resources

Objectives

- Increase and maintain shorebird (species injured by the *DWH* Oil Spill) use of beach habitat
- Increase and maintain wading bird habitat (species injured by the *DWH* Oil Spill) use in acquired habitats

a. Performance Criteria: Increase shorebird habitat use by year 5
b. Performance Criteria: Maintain wading bird habitat use by year 5

Adaptive Management: The adaptive management approach to the Graveline Bay Land Acquisition and Management proposed alternative is detailed in the MAM Plan (Appendix D). It includes interim performance criteria for helping determine whether adjustments to the project are needed to better ensure the project meets the final performance criteria used to determine project success, as well as the potential adaptive management actions (e.g., mid-course corrections or corrective actions) that may be considered for individual parameters. The MAM Plan includes a list of potential adaptive management actions for each parameter to be considered. Parameters include acres acquired, invasive species, vegetation structure and composition, shorebird and wading bird diversity and abundance. The MAM Plan does not include all possible options; rather, it includes a list of potential adaptive management actions for each individual parameter to be considered. The decision to implement a corrective action should holistically consider the overall outcomes of the restoration project by assessing the results of all monitoring parameters.

Proposed Project Alternative: Grand Bay Land Acquisition and Habitat Management

This restoration project is being implemented within the proposed alternative boundary which includes of the Grand Bay NWR, Grand Bay NERR and Grand Bay Savanna CP. Restoration activities involve the acquisition of private parcel inholdings and restoration of habitats, where applicable. This project is intended to help restore habitats and resources injured from the *DWH* Oil Spill, including coastal, estuarine, and riparian habitats; and birds. MDEQ and DOI would be Implementing Trustees for the project. DOI will also be the lead federal agency for conducting the environmental evaluation review for implementation. MDMR would be a project partner. The MAM Plan for the Grand Bay Land Acquisition and Habitat Management proposed alternative is included as Appendix E of this RP/EA. A summary of goals and objectives are provided here.

Goal 1: Restore and Conserve Habitat

Objectives

- Acquire lands and implement management techniques to increase and maintain native vegetation species composition in restored habitats;

    a. Performance Criteria: Acquisition
        i. Fee-title acquisition of priority habitats in the project area up to 8,000 acres
    b. Performance Criteria: Management
        i. Vegetation structure for coastal pine savanna habitat (by year 5)
            - <20% canopy cover of longleaf or slash pine
            - 40-100% herbaceous cover
            - Invasive nonnative plant species in any stratum present but sporadic (1-5 % cover)
        ii. Vegetation Composition for coastal pine savanna habitat
            - 95% native flora
        iii. Base-line habitat characteristics of high quality open pine savanna habitat
            - Use of habitat by wintering Henslow's sparrow (*Ammodramus henslowii*) (presence/absence)

Goal 2: Replenish and Protect Living Coastal and Marine Resources

Objectives

- Acquire lands and implement management techniques to increase bird diversity, abundance, and habitat utilization

    a. Performance Criteria: Use of habitat by injured wading bird species

Adaptive Management: The adaptive management approach to the Grand Bay Land Acquisition and Habitat Management proposed alternatives is detailed in the MAM Plan (Appendix E). It includes interim performance criteria for helping determine whether adjustments to the project are needed to better ensure the project meets the final performance criteria used to determine project success, as well as the potential adaptive management actions (e.g., mid-course corrections or corrective actions) that may be considered for individual parameters. The MAM plan includes a list of potential adaptive management actions for each parameter to be considered. Parameters include acres acquired, invasive species, vegetation structure and composition, and bird species monitoring. The MAM Plan does not include all possible options; rather, it includes a list of potential adaptive management actions for each individual parameter to be considered. The decision to implement a corrective action should holistically consider the overall outcomes of the restoration project by assessing the results of all monitoring parameters.

Proposed Project Alternative: Upper Pascagoula River Water Quality Enhancement

Restoration involves the implementation of agricultural conservation practices to reduce sediment, phosphorus, and nitrogen loadings in target watersheds, and to downstream coastal receiving waters. The proposed conservation practices would reduce nutrient losses from the landscape, reduce nutrient loads to streams and downstream receiving waters, and reduce water quality degradation in watersheds thus providing benefits to marine resources and benefits to coastal watersheds. This project is intended to reduce nutrient and sediment load contribution in watersheds that contain Gulf sturgeon [*Acipenser oxyrinchus desotoi]* Critical Habitat. The Gulf sturgeon is anadromous, spending much of its life in marine environments, but spawning in the Upper Pascagoula River and tributaries. Sediment and other pollutants may reduce Gulf sturgeon spawning success. USDA would be the lead Implementing Trustee for the project working with other Trustees and with NRCS as a project partner. MDEQ and EPA will assist in monitoring the project. USDA will also be the lead federal agency for conducting the environmental evaluation review for implementation. The MAM Plan for the Upper Pascagoula Water Quality Enhancement proposed alternative is included as Appendix F of this RP/EA. A summary of goals and objectives are provided here.

Goal 1: Restore Water Quality

Objectives

- Reduce sediment, phosphorus, and nitrogen loads leaving private lands in prioritized watersheds in the Pascagoula Basin

  a. Performance Criteria: x kg of suspended sediments trapped from treatment site; x kg of phosphorous trapped from treatment site; x kg of nitrogen trapped from treatment site Goal
- Identify instream habitat features that are influenced by upstream sediment and nutrient loads for future instream resource benefits.

  a. Performance Criteria: N/A

Adaptive Management: Adaptive management on specific conservation practices being implemented beyond inspection and maintenance is not anticipated for this project. Monitoring information from this restoration project would be critical to refine targeting of conservation practice implementation, refining in-stream habitat use by Gulf sturgeon if found, as well as identifying instream habitat that could be enhanced by conservation practices for Gulf sturgeon use as needed.

5.3 MAM Plan Administration

MAM Plans are living documents and will be updated as needed to reflect changing conditions and/or to incorporate new information as projects progress and are implemented. For example, the plan may need to be revised if the project design changes, if initial data analysis indicates that the sampling design is inadequate, or if any uncertainties are resolved or new uncertainties are identified during project implementation and monitoring. Any future revisions to this document and individual project MAM plans will be made publicly available through the Restoration Portal by the web links provided here. Full monitoring plans include descriptive information regarding monitoring goals, objectives, parameter details (e.g. methodology, sample size, timing/frequency), project-level decisions, and monitoring schedules and budgets.

6.0 Response to Public Comment

Public comments received on the draft RP/EA were reviewed and grouped into general topics. Similar comments within each topic were then grouped together, for which the MS TIG prepared a response. The resulting comment list and associated responses are provided below.

6.1 General Support

1. **Comment: Several commenters expressed support for the proposed selection of the preferred alternatives.**

   Response: The MS TIG appreciates and acknowledges the support.

2. **Comment: Commenters expressed support for the selection of various restoration approaches and techniques including enhancing and restoring habitats for the benefit of water quality, birds, land conservation and stewardship, and land protection through easements and acquisitions. Commenters also stated that these restoration approaches and techniques offer multiple water quality benefits, which in turn contribute to habitat health for living resources.**

   Response: The MS TIG appreciates and acknowledges the support.

3. **Comment: Commenter expressed support for the plan because it recognizes that upstream water quality and quantity issues from major river systems such as the Pascagoula significantly impact the Mississippi Sound's ecosystem and overall environmental health.**

   Response: The MS TIG appreciates and acknowledges the support. As described in the plan, the MS TIG is focused on water quality projects that would benefit resources in the Mississippi Sound.

4. **Comment: Several Commenters expressed support for the MS TIG goals and objectives identified in the Draft RP/EA which included regional connectivity, leveraging, partnering, and regional planning initiatives.**

   Response: The MS TIG appreciates and acknowledges the support.

5. **Comment: Commenters supported the Draft RP/EA being consistent with the restoration goals and approaches outlined in the PDARP/PEIS.**

   Response: The MS TIG appreciates and acknowledges the support.

6.2 Public Participation and Engagement

6. **Comment: Commenters expressed support for incorporating stakeholder and community engagement early in the restoration planning efforts, for the MS TIG's effort to engage the public in the process, for MS TIG members making themselves available for public inquiries, and for the presentation of the MS TIG screening process at the Annual Restoration Summit.**

   Response: The MS TIG appreciates and acknowledges the support.

7. **Comment: Commenters expressed the following public participation and engagement concerns related to the development of the Draft RP/EA: lack of transparency, lack of public access to decision-making information and process, lack of meaningful public engagement, and that adequate time was not provided to review the document.**

   Response: The MS TIG acknowledges these comments and will continue to consider these public participation and engagement concerns in the future. Section 1.7 (Public Involvement) summarizes the MS TIG's pubic involvement efforts related to the 2016-2017 DRAFT RP/EA. On May 27, 2016, the MS TIG invited the public to submit or update projects and project ideas to the Mississippi Restoration website and the Trustee Council website. On October 31, 2016, the MS TIG followed the initial request for project ideas with a Notice of Initiation for Restoration Plan Drafting in Mississippi. In developing the Draft RP/EA, the MS TIG considered projects and project ideas submitted by the public through the MDEQ Restoration Project Idea Portal and the DWH Trustee Project Submission Portal, and projects proposed in response to the MS TIG's May 27, 2016 Notice. The public was provided a 45-day review and comment period on the Draft RP/EA, which the MS TIG believes was sufficient for the scope of the proposed plan. Further, there were no requests to extend the comment period.

8. **Comment: Commenters requested additional opportunities to provide public and stakeholder review and input in the future development of any selected projects in the plan.**

   Response: The MS TIG appreciates the comment and will continue to take the request into consideration.

9. **Comment: Commenters requested that the TIG hold at least one public meeting that coincides with the comment period on restoration plans.**

   Response: The MS TIG appreciates the comment and will take the request into consideration in the development of future restoration plans.

10. **Comment: Commenter(s) expressed concern that many populations, such as the Vietnamese-American fisher folks and fishing communities, have language access needs and/or lack access to computers, and that the online portal does not allow for active public participation in the development phase of proposed projects.**

    Response: The MS TIG understands that some members of the community, such as the Vietnamese American fisher folk and fishing communities, have special language needs and may lack access to computers. In an effort to accommodate these needs, the MS TIG translated project fact sheets and the Draft RP/EA Executive Summary into Vietnamese. Further, Vietnamese translators were available at the MS TIG annual meeting where these proposed 2016/2017 RP/EA projects were introduced. Comments on the plan were solicited and could be provided in writing by U.S. mail as well as by online access. The MS TIG is open to additional suggestions on how to further facilitate language access needs, and will continue to consider these suggestions.

11. **Comment: Commenters provided suggestions on how the public participation and engagement process should improve, including, consulting with fishing communities during the project development phase by supporting/hosting coastal restoration workshops and roundtables.**

Response: The MS TIG acknowledges the suggestions to improve public participation in planning and project development and will continue to consider these suggestions for future restoration planning efforts.

12. **Comment: Commenter(s) expressed a need to prioritize the translations during the planning stages, requested that the MS TIG translate more materials into Vietnamese (in addition to the fact sheets and Executive Summary), and expressed concern over inaccurate Vietnamese translation.**

    Response: The MS TIG acknowledges the suggestions to prioritize Vietnamese translations during the planning stages and to translate more materials into Vietnamese. The MS TIG will take these suggestions into consideration for future restoration planning efforts.

13. **Comment: Commenter requested that competent, qualified translators and organizations that are familiar with Gulf of Mexico marine lexicon, the fishing industry, and coastal restoration scientific jargon be identified during the early planning stages.**

    Response: The MS TIG acknowledges these suggestions for hiring translators and will take these suggestions into consideration for future restoration planning efforts.

14. **Comment: Commenters expressed concern that projects were not vetted with stakeholders and commenter(s) noted that it is unclear how public input shaped the development of the Draft RP/EA.**

    Response: On May 27, 2016, the MS TIG solicited project ideas from the public (See Section 1.7 of the Final RP/EA). Following the OPA regulations (15 C.F.R. § 990.53), the MS TIG developed a screening process to develop a reasonable range of alternatives to be further evaluated in the Draft RP/EA. The process of how the MS TIG reviewed project ideas submitted by the public (input) and how that shaped the development of the Draft RP/EA is more fully described in Sections 2.4and Section 6.0 of the RP/EA.

15. **Comment: Commenter(s) suggested the TIG include a summary of public scoping comments that were submitted in response to the TIG's May 27th, 2016, Notice of Initiation of Restoration Planning.**

    Response: The TIG, in accordance with the Trustee Council Standard Operating Procedures, provided an opportunity for public input on project ideas. The majority of the public input came in the form of project idea submittals to the Trustee portals. The MS TIG received one correspondence via e-mail that included a list of project ideas. All of the project ideas and/or project components were similar to project ideas or components of project ideas that were already in one or both Trustee portals. All project ideas that were submitted to the portals by September 28, 2016 were considered in the development of this plan.

6.3 NEPA Compliance

16. **Comment: Commenter(s) expressed concern that the TIG Draft 2016-2017 Restoration Plan/Environmental Assessment does not clearly address alternative(s).**

    Response: Alternative development and selection is explained in Sections 2.4, 2.5, 2.6 and 2.7 of the RP/EA.

17. **Comment: Commenter(s) expressed concern that the TIG Draft 2016-2017 Restoration Plan/Environmental Assessment failed to identify a scientific basis for project selection and recommended that a comprehensive EA and EIS be conducted.**

Response: The MS TIG Draft RP/EA is consistent with the Programmatic Damage Assessment and Restoration Plan/Programmatic Environmental Impact Statement, or PDARP/PEIS, which was developed by the DWH Trustees to guide and direct the DWH restoration effort. The restoration types and approaches that are being proposed for selection in this MS TIG RP/EA are outlined in the PDARP/PEIS, and proposed to partially address injuries to resources in the Mississippi Restoration Area. As discussed in Section 1.3.4 of the RP/EA, the MS TIG also incorporated elements of the Mississippi Gulf Coast Restoration Plan (MGRP) in project selection. The MGRP includes the Mississippi Comprehensive Ecosystem Restoration Tool (MCERT), a science-based tool that is now in place for identifying and examining ecological resources and threats in Mississippi, as well as a Decision Support System. Use of these tools improves restoration planning and assists the MS TIG in making informed, science-based decisions for enhancing, protecting, or restoring the ecological integrity of coastal Mississippi.

6.4 Document Clarifications

18. **Comment: Commenter(s) stated that Section 2.4.1 MS TIG Screening Process was difficult to follow and that it should incorporate summary figures and/or tables for additional clarity. Commenters also requested additional illustrations to provide vital insight into how the TIG developed and applied the screening rationale for evaluating and selecting potential projects.**

Response: Figure 2.4-1 shows the generalized process of screening projects in order to identify the reasonable range of alternatives for WCHN/Birds and NR restoration projects. Section 2.4.1 was revised to provide further clarity.

6.5 Project-Specific Comments – Grand Bay Land Acquisition and Habitat Management

19. **Comment: Commenter expressed support for the selection of the Grand Bay Land Acquisition and Habitat Management project.**

Response: The MS TIG appreciates and acknowledges the support.

6.6 Project-Specific Comments – Upper Pascagoula River Water Quality Enhancement

20. **Comment: Commenter(s) expressed support for the inclusion of private landowners in the Upper Pascagoula River Water Quality Enhancement project.**

Response: The MS TIG appreciates and acknowledges the support.

21. **Comment: Commenter(s) suggested utilizing non-traditional outreach methods and a non-regulatory approach to reach property owners within the focal areas during**

implementation of the Upper Pascagoula River project as a means to expand voluntary conservation practices on private lands.

Response: USDA, the lead Trustee implementing the Upper Pascagoula Water Quality Enhancement Project, would use a voluntary approach accompanied by extensive public outreach to landowners to implement the project. USDA is experienced in using non-traditional outreach methods to reach property owners in Mississippi and will do so in implementing the Upper Pascagoula River Water Quality Project.

22. **Comment: Commenters expressed concern about the potential effect of the Pascagoula River Drought Resiliency Project on the long-term success of the Upper Pascagoula Water Quality Enhancement Project.**

    Response: The MS TIG appreciates the concern and has considered the proposed Pascagoula River Drought Resiliency Project (PRDRP) relative to the success of the Upper Pascagoula River Water Quality Enhancement Project. Because the PRDRP proposed locations are on tributaries of the lower Pascagoula River that are geographically separate from the Upper Pascagoula River where the water quality enhancement project would be implemented. The Upper Pascagoula Water Quality Enhancement Project is intended to reduce the amount of sediment and nutrients reaching the Mississippi Sound and, based on the proposed location of the PRDRP, the Upper Pascagoula Water Quality Enhancement Project will provide the anticipated benefits.

6.7 Project- Specific Comments – Graveline Bay Land Acquisition and Habitat Management

23. **Comment: Commenter expressed support for the proposed acquisition of parcels, habitat management, acquisition of Graveline Beach, management measures including proposed prescribed burning, and the potential to educate the public on the value of prescribed burning associated with the Graveline Bayou Land Acquisition and Management Project.**

    Response: The MS TIG appreciates and acknowledges the support.

24. **Comment: Commenter suggest that accountability measures on the proper use of land acquisition/conservation funds should be made available for public review.**

    Response: Trustee accountability measures are addressed in Section 7.6 and Section 7.7.3 Restoration Tracking and Reporting of the PDARP/PEIS and the Trustee Council Standard Operating Procedures for Implementation of the Natural Resource Restoration for the *Deepwater Horizon* (DWH) Oil Spill (SOPs) Section 7.0 Administrative Accounting and Audit Systems and Section 12.0 Reporting. In addition, consistent with other lands located in Mississippi Coastal Preserves, the parcels acquired as part of the Graveline Bay Land Acquisition and Habitat Management Project would be subject to restrictions that assure the proper use and conservation of the acquired lands.

25. **Comment: Commenters recommended that the MS TIG identify who will be responsible for ongoing management of lands and habitats at the end of this project.**

Response: The Mississippi Coastal Preserve Program would be responsible for ongoing management of lands and habitats at the end of the project.

26. **Comment: Commenters requested that the Final RP/EA should include more detailed budgets, with cost estimates (where applicable) for planning, engineering, construction, monitoring and project maintenance.**

    Response: The MS TIG will develop project budgets during the implementation phase and report expenditures on an annual basis; however, the budgets developed for the RP/EA included consideration of all project phases necessary to successfully implement the project.

27. **Comment: Commenters had specific comments related to the Graveline Bay Land Acquisition and Management Project Monitoring and Adaptive Management Plan. Specifically, these included addressing the schedule for monitoring as well as reducing the number of bird surveys.**

    Response: Edits were made to Appendix D of FRP/EA (the Graveline Bay Land Acquisition and Habitat Monitoring and Adaptive Management Plan) to reflect this comment.

28. **Comment: Commenter supported data sharing and the transparency outlined in the Graveline Bay Land Acquisition and Habitat Management Project Monitoring and Adaptive Management Plan.**

    Response: The MS TIG appreciates the support for the data sharing/transparency efforts.

29. **Comment: Commenter(s) expressed concern with the following statement in the Graveline Bay Land Acquisition and Habitat Management Project section: "sandy material is distributed and deposited via longshore currents. The beach habitat also exhibits soft, easily erodible marsh terraces directly in front of the beach deposits." The commenter(s) states that although there is a westward longshore current, the major force distributing and depositing sandy material above tideline is storm surge.**

    Response: Edits were made to Section 3.3.1.3.1 Habitats of the Graveline Bay Land Acquisition and Habitat Management project. The description of Beach habitat within this subsection has been edited to reflect this concern statement.

30. **Comment: Commenter(s) suggested adding torpedo grass to the list of invasive plants for management and assess this grass for its impact on Diamondback Terrapin nesting success.**

    Response: Torpedo grass was added to the Environmental Consequences for Habitats invasive species list (under Mechanical Treatment/Prescribed Fire), Section 3.3.1.3.1.

31. **Comment: Commenter(s) suggested showing more clearly where Road Removal/Repair and Culvert Replacement sites would be located.**

    Response: Locations of road removal/repair and culvert replacement would depend on the specific parcels acquired and restoration measures and management activities selected for the parcels. Based on aerial photography, it is currently estimated that up to 4 acres of road removal/repair may occur. Site inspections would be needed to determine the exact locations of roads, culverts, and to assess which portions need to be removed, repaired, and/or which culverts would need to be replaced.

32. **Comment: Commenter(s) suggested amending the note on Table 3.3-7 to show known presence of piping plover on Graveline Beach.**

    Response: Edits were made to Table 3.3-7 to note the presence of Piping Plover of Graveline Beach.

33. **Comment: Commenter(s) suggested re-wording 3.3.1.3.2 "best practices" from "During recreational use, enforce leash or "no pet" policies in critical or important habitats" to "….consider leash or "no pet" policies in critical or important habitats."**

    Response: The edit has been incorporated in Section 3.3.1.3.2.

34. **Comment: Commenter(s) suggested correcting Rabbit (*Oryctolagus cuniculus*) to the proper species Swamp Rabbit (*Sylvilagus aquaticus*) in two instances.**

    Response: The edit has been incorporated into Section 3.3.1.3.4 Wildlife.

35. **Comment: Commenter(s) suggested including River Otter, *Lontra canadensis* in Graveline wildlife discussion.**

    Response: The edit has been incorporated in the wildlife discussion in Section 3.3.1.3.4.

36. **Comment: Commenter stated that they would like to have seen the undeveloped south shore fringe of Graveline Bay included in the land parcels and acknowledged that there may be other opportunities to acquire these properties.**

    Response: The MS TIG will consider the comment in future restoration planning.

37. **Comment: Commenter suggested determining the significance of Old Shell Landing in the Cultural Analysis.**

    Response: All restoration measures and management activities completed by the MS TIG will comply with the National Historic Preservation Act, as described in Section 3.3.1.4.3 Cultural Resources.

38. **Comment: Commenter recommended management of gopher tortoise habitat.**

    Response: The MS TIG acknowledges the recommendation to provide management of gopher tortoise habitat and will consider the comment in future planning.

39. **Comment: Commenter recommended analyzing shoreline retreat and management.**

    Response: The MS TIG acknowledges the recommendation to analyze shoreline retreat and management and will consider the comment in future planning.

40. **Comment: Commenter(s) recommended creation of educational trails in the Graveline Bay Coastal Preserve.**

    Response: The MS TIG acknowledges the recommendation for the creation of an educational trail in the Graveline Bay Coastal Preserve and will consider it in future restoration planning.

41. **Comment: Commenter(s) recommended enhancing nesting success of raptors by installing artificial nesting platforms.**

    Response: The MS TIG acknowledges the recommendation to enhance nesting success of raptors by installing nesting platforms and will consider it in future restoration planning.

6.8 Monitoring and Adaptive Management Plan

42. Comment: Commenter expressed appreciation that the Draft RP/EA appendices included Draft Monitoring and Adaptive Management Plans.

Response: The MS TIG appreciates and acknowledges the support.

43. Comment: Commenters suggested establishing a Gulf Monitoring & Adaptive (Management) Plan with uniform monitoring metrics, outcomes, standards, and approaches that is made available for public comment prior to selection of future projects by the TIGs.

Response: The SOPs describe the procedures for developing the Monitoring and Adaptive Management Manual. MS TIG representatives are participating on the development of the Monitoring and Adaptive Management Manual and projects proposed by the MS TIG in the future will abide by the procedures described in the SOP.

44. Comment: Commenter(s) suggested adapting MAM monitoring standards and approaches for the projects once the MAM manual is complete.

Response: The procedures for developing the Monitoring and Adaptive Management Manual and the development of the Cross-TIG MAM work group are described in Section 10.0 of the SOP. The MS TIG worked in conjunction with the Cross-TIG MAM group to develop project-specific MAM plans for the preferred alternatives in the Draft RP/EA. The MS TIG will continue to consult with the Cross-TIG MAM work group to update project-specific MAM plans in compliance with the SOP.

45. Comment: A commenter stated that there was great uncertainty whether the proposed projects will meet restoration outcomes.

Response: The MS TIG proposed these projects, in part, because they each have a high likelihood of success based on the MS TIG Trustees' experience with similar types of restoration projects; therefore, the MS TIG has a clear understanding of the projects and expects to achieve the predicted outcomes.

6.9 Beyond the Scope of the Draft RP/EA: TIG Structure

46. Comment: Commenter(s) stated that the organization of the TIGs is inefficient and should be reorganized.

Response: The DWH Trustee Governance structure was considered in relation to the PDARP/PEIS. The Trustees believe that restoration decisions and priorities are best decided by the entities that have the most knowledge of and jurisdiction over resources in each Restoration Area. Separating the governance structure to include five Restoration Areas that are specific to Gulf State boundaries was determined to help ensure that restoration decisions are made in an efficient manner while also establishing guiding documents to ensure consistency such as the PDARP/PEIS, Trustee Council SOP, and the MAM Manual.

6.10 Beyond the Scope of the Draft RP/EA: Future Restoration Planning

47. **Comment: Commenters provided remarks and suggestions for the MS TIG to consider in future restoration planning including: providing annual updates at public meetings; planning over a multi-year time frame; leveraging within restoration types, across TIGs, and across funding streams; and to continue synergistic restoration efforts to maximize their collective impact in a comprehensive, science-based, and cost-effective manner.**

    Response: The suggestions are appreciated by the MS TIG and will be considered in the planning and development of future restoration plans.

7.0 List of Preparers and Reviewers

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MISSISSIPPI DEPARTMENT OF ENVIRONMENTAL QUALITY		
MDEQ	Tabatha Baum	Attorney
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Covington Civil & Environmental, LLC	Christopher W. Thomas	Project Scientist
NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION		
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U.S. ENVIRONMENTAL PROTECTION AGENCY		
Gulf of Mexico Program	Troy Pierce	Chief Scientist
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U.S. DEPARTMENT OF THE INTERIOR		
U.S. Fish and Wildlife Service	Jon Hemming	*DWH* NRDAR Field Office
U.S. Fish and Wildlife Service	Brian Spears	USFWS *DWH* NRDAR Restoration Program Manager
U.S. Department of the Interior	Robin Renn	NEPA Coordinator
U.S. Department of the Interior	Brian Ferrasci-O'Malley	Attorney

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Appendix A:
Environmental Evaluation Worksheets

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Graveline Bay Land Acquisition and Management

Environmental Evaluation Worksheet

MS TIG 2016-2017 RP/EA Environmental Evaluation Worksheet for Graveline Bay Land Acquisition and Management[1]

A. Proposed Actions and Affected Habitat Types (Describe Restoration Measures and Management Activities Proposed on the Project Site)

Click here to enter text.

Potential Restoration Measures and Management Activities	Proposed Action (indicate with "x")	Treatment Area: Length	Treatment Area: Acres	Affected Area Habitat/Ecosystem	Comments
Access Restriction	Click here to enter text.	Click here to enter text.	Click here to enter text.	Click here to enter text.	Click here to enter text.
Chemical Treatment	Click here to enter text.	Click here to enter text.	Click here to enter text.	Click here to enter text.	Click here to enter text.
Mechanical Treatment	Click here to enter text.	Click here to enter text.	Click here to enter text.	Click here to enter text.	Click here to enter text.
Prescribed Fire	Click here to enter text.	Click here to enter text.	Click here to enter text.	Click here to enter text.	Click here to enter text.
Debris Removal	Click here to enter text.	Click here to enter text.	Click here to enter text.	Click here to enter text.	Click here to enter text.
Road Repair/Removal and Culvert Placement	Click here to enter text.	Click here to enter text.	Click here to enter text.	Click here to enter text.	Click here to enter text.

1. Will the restoration measures and management activities be implemented consistent with the habitat types in the table below? (Check one)

   a. ☐Yes

   b. ☐No. Notify the TIG before taking further action.

[1] The MS TIG has developed the Environmental Evaluation Worksheet in order to facilitate NEPA review of site-specific restoration measures and management activities as they are identified in the future. The Trustees may improve/revise the Environmental Evaluation Worksheet with future usage.

Habitat	Access Restriction	Invasive Species Management-Chemical Treatment	Invasive Species Management-Mechanical Treatment	Invasive Species and Habitat Management-Prescribed Fire	Debris Removal	Road repair/removal and culvert placement
Estuarine Marsh						
Beach	X	X	X		X	
Beech Magnolia Forest		X			X	
Fire-suppressed pine savanna		X	X	X	X	X
Coastal Plain Small Stream Forest		X	X	X	X	

2. Best Practices
   a. Which of the applicable Best Practices listed in the Final RP/EA will be followed (Attachment A)? List them here.
      Click here to enter text.
   b. Identify any Best Practices or other mitigation measures not included in the Final RP/EA that will be implemented, including those associated with consultations (Attachment B) and required permits. List Best Practices and/or mitigation measures here:
      Click here to enter text.

B. Permits and Consultations

Authorization	Authorization Name/Number	Date Issued/Anticipated	Notes
CWA Section 404	Click here to enter text.	Click here to enter text.	Click here to enter text.
RHA Section 10	Click here to enter text.	Click here to enter text.	Click here to enter text.
Mississippi Department of Marine Resources Coastal Wetlands Authorization	Click here to enter text.	Click here to enter text.	Click here to enter text.
CWA Section 401-Water Quality Certification	Click here to enter text.	Click here to enter text.	Click here to enter text.

1. ESA
   a. Identify ESA-protected species and/or designated critical habitat on the parcel where work will be performed.
      Click here to enter text.

b. Were all ESA-protected species and/or designated critical habitat, as well as the actions being proposed and their potential effects to protected species and/or critical habitat included in the Final RP/EA and consultation(s) or a subsequent consultation(s)? (Check one)
   i. ☐Yes. Insert date consultation completed: Click here to enter text..
   ii. ☐No. Consult with the MS TIG to determine if additional consultations are needed prior to approval to proceed.

c. Will the applicable best practices and/or conservation measures be followed for all protected species and designated critical habitat that would be affected by the proposed action (Attachments A and B)?
   i. ☐Yes. Go to the next question.
   ii. ☐No. Consult with the MS TIG to determine if additional consultation(s) are needed prior to approval to proceed.

2. NHPA

Is the proposed action an undertaking with potential for adverse effects on resources protected by NHPA as determined by a qualified cultural resource specialist? (Check one)

a. ☐No. Go to the next question.
b. ☐Yes. Consult with the MS TIG to determine if additional consultation(s) will be needed prior to approval to proceed.

C. Environmental Impacts

Will the proposed restoration measures and management activities, when implemented with appropriate Best Practices, result in adverse effects to the ***physical, biological or socioeconomic environment*** that are less than or equal to the adverse effects identified in the 2016-2017 FRP/EA (Attachment C)?

(Check one)

1. ☐Yes.
2. ☐No. Notify the TIG of the before taking further action.

D. Finding (select one)

1. ☐The proposed actions and anticipated effects fall within scope of the Final MS TIG 2016-2017 RP/EA and no further analysis is required.
2. ☐The proposed actions and anticipated effects may not fall within the scope of the Final MS TIG 2016-2017 RP/EA and additional analysis may be required.

To the best of my knowledge, the information above is accurate and complete:

Click here to enter text.	Click here to enter text.
Name (Planner(s) Name/Signature)	Date

Submitted to federal representative of MS TIG for review and concurrence on (Date:) Click here to enter text.

☐MS TIG federal representative finds no further NEPA analysis is necessary.

☐MS TIG federal representative finds additional NEPA analysis is necessary.

Click here to enter text.	Click here to enter text.
Signature (Federal representative(s) of the MS TIG)	Date

Attachment A

BEST PRACTICES

Physical Environment

Geology and Substrates

- Allow revegetation of fire breaks or actively revegetate with native species or annual grasses, if prolonged period of greening up is anticipated.
- Develop and implement spill prevention and response plan, including conducting daily inspections during chemical treatment, mechanical treatment and prescribed fire operations to ensure there are no leaks of antifreeze, hydraulic fluid, pesticides or other substances.
- To the extent practicable, for equipment use in wet areas, soft tracked or wide tracked equipment should be used to distribute the equipment weight and minimize impacts to soils. Alternatively, crews may remove vegetative material with chainsaws.

Hydrology and Water Quality

- In the execution of land acquisition and the design of habitat management measures the MS TIG would consider resiliency measures to facilitate habitat migration due to sea level rise.
- Develop and implement an erosion control plan to minimize erosion during and after construction and where possible use vegetative buffers (100 feet or greater), revegetate with native species or annual grasses, and to the extent practicable, conduct work during dry seasons.
- For chemical treatment, personnel applying chemicals would follow all warning labels on chemical containers and proper permits would be secured prior to treatment activities. Personnel will apply herbicide in accordance with the direction and guidance provided on the appropriate U.S. Environmental Protection Agency (EPA) labels and state statutes during land-based activities.
- Soft track or wide track equipment would be used in wet areas to the extent practicable. Alternatively, crews may remove vegetative material with chainsaws.
- Avoid and minimize, to the maximum extent practicable, placement of dredged or fill material in wetlands and other aquatic resources. Design construction equipment corridors to avoid and minimize impacts to wetlands and other aquatic resources to the maximum extent practicable. If required, a USACE permit and/or MDMR Coastal Wetlands Permit would be obtained; likely a Nationwide 27 (Aquatic Habitat Restoration, Establishment, and Enhancement Activities) as well as MDMR Coastal Wetlands Permit (if required). USACE permit and/or MDMR Coastal Wetlands permit conditions (if required) would be adhered to in all operations.
- Designate a vehicle staging area removed from any natural surface water resource or wetland to perform fueling, maintenance, and storage of construction vehicles and equipment. Inspect vehicles and equipment daily prior to leaving the storage area to ensure that no petroleum or oil products are leaking.

- Develop and implement a spill prevention and response plan, including conducting daily inspections of all construction and related equipment to ensure there are no leaks of antifreeze, hydraulic fluid, or other substances and cleaning and sealing all equipment that would be used in the water to rid it of chemical residue.
- Control dust related to construction site activities through a Soil Erosion Sediment Control Plan that includes spraying of a suppressing agent on dust piles (non-hazardous, biodegradable).
- Cover trucks hauling loose materials.

Air Quality and Greenhouse Gas Emissions

- Shut down idling construction equipment, if feasible.
- Encourage the use of the proper size of equipment for the job to maximize energy efficiency.
- Use of ultra-low sulfur diesel fuel in off-road construction equipment with engine horsepower (HP) rating of 60 HP and above.

Biological Environment

Habitats (Invasive Species Control)

- Prior to bringing any equipment (including personal gear, machinery, vehicles, or vessels) to the work site, inspect each item for mud or soil, seeds, and vegetation. If present, clean the equipment, vehicles, or personal gear until they are free from mud, soil, seeds, and vegetation.
- Inspect the equipment, vehicles, and personal gear each time they are being prepared to go to a site or prior to transferring between sites to avoid spreading exotic, nuisance species.

Migratory Birds and Bald Eagles

<u>Migratory Birds</u>

- Use care to avoid birds when operating machinery or vehicles near birds.
- Avoid working in migratory bird nesting habitats during breeding, nesting, and fledging (approximately mid-February through late August). If proposed alternative activities must occur during this timeframe and breeding, nesting, or fledging birds are present, contact the state trust resource agency to obtain the most recent guidance to protect nesting birds or rookeries, and their recommendations will be implemented.
- Conservation areas may already be marked to protect bird nesting areas. Stay out of existing marked areas.
- If vegetation clearing is necessary, clear vegetation outside the migratory bird nesting season (approximately mid-February through late August) or have a qualified biologist inspect for active nests. If no active nests are found, vegetation may be removed. If active nests are found, vegetation may be removed after the nest successfully fledges.

<u>Bald Eagles</u>

- If bald eagle breeding or nesting behaviors are observed or a nest is discovered or known, have all activities avoid the nest by a minimum of 660 feet. If the nest is protected by a vegetated buffer where there is *no* line of sight to the nest, then the minimum avoidance distance is 330 feet. Maintain this avoidance distance from the onset of breeding/courtship behaviors until any eggs have hatched and eaglets have fledged (approximately 6 months).

- If a similar activity (such as driving on a roadway) is closer than 660 feet to a nest, maintain a distance buffer as close to the nest as the existing tolerated activity. If a vegetated buffer is present and there is no line of sight to the nest and a similar activity is closer than 330 feet to a nest, then maintain a distance buffer as close to the nest as the existing tolerated activity.
- In some instances, activities conducted within 660 feet of a nest may result in disturbance, particularly for the eagles occupying the Mississippi barrier islands. If an activity appears to cause initial disturbance, stop the activity and move all individuals and equipment away until the eagles are no longer displaying disturbance behaviors. Contact the USFWS's Migratory Bird Permit Office to determine how to avoid impacts or if a permit may be needed.

ATTACHMENT B

Graveline Bay Land Acquisition and Management Best Practices Summary Table

Species/Restoration Measure	Best Practice
Best Practice for Protected Species That Could Occur in the Graveline Bay Land Acquisition and Management Project Area	
Alabama Red-Belly Turtle	Surveys will be conducted in potential habitat. Survey results will be considered in the design of the restoration measures and management activities to either avoid or minimize impacts to the species. Best management practices outlined in applicable erosion control plans and applicable spill prevention plans will be implemented to minimize the indirect impacts.
Black pinesnake	Exemptions under Section 4(d) of the Endangered Species Act allow the following management activities within habitats occupied by the black pinesnake: (1) Prescribed burning, including all fire break establishment and maintenance actions, as well as actions taken to control wildfires; and (2) Herbicide application for invasive plant species control, site- preparation, and mid-story and understory woody vegetation control. All exempted herbicide applications must be conducted in a manner consistent with Federal law, including Environmental Protection Agency label restrictions; applicable State laws; and herbicide application guidelines as prescribed by herbicide manufacturers and ; (3) All forest management activities that maintain lands in a forested condition, except for: (a) Conversion of longleaf-pine-dominated forests (>51 percent longleaf in the overstory) to other forest cover types or land uses; or (b) those activities causing significant subsurface disturbance, including, but not limited to, shearing, wind-rowing, stumping, disking (except during fire break creation or maintenance), root-raking, and bedding. Areas requiring mechanical treatment such as shearing, wind-rowing, stumping, disking, root raking and bedding are typically dominated by invasives woody shrub and tree species and are not suitable habitat (open canopy settings) for black pine snake. An assessment of habitat would be completed. Surveys would be conducted of areas that have potential black pinesnake habitat. The results would be considered in the design of the management and or restoration measures to avoid or minimize impacts to the species. The Implementing Trustee would coordinate with the USFWS Jackson Field Offices if help is needed on identification of habitat, conducting of surveys and/or the development of practices on a site-specific restoration plan.
Gopher tortoise	A qualified biologist will conduct gopher tortoise surveys in areas that have suitable habitat and if burrows are identified, the following conservation measures will be implemented to avoid or minimize impacts: **1) Mechanical Treatment -** To the extent practicable, vegetation clearing within 13 feet of a gopher tortoise burrow would be conducted but with hand tools (i.e., weed trimmer, push mower, chainsaws). In specific cases where the hand tool restriction imposes additional costs and time required to maintain mowed areas, the specific provisions for mowing operations with bush-hog or rotary cutters within 13 feet of active and inactive gopher tortoise burrows during the dormant season only (October through April) are as follows: the path of the tractor and mower will be directed so that tires do not cross directly over the burrow entrance, or plane of the underground burrow. However, tractors and mowers of sufficient width can be backed or pulled directly over the burrow apron, entrance, and its underground plane by straddling the wheels on either side of the burrow and apron. Whenever possible, mowing should be conducted in the winter to reduce the likelihood of gopher tortoises being active above ground. If practical, mowing should be planned for cloudy days when the temperatures are coolest. Heavy equipment will stay 14 M (13 ft) from known gopher tortoise burrows. Heavy equipment includes tractors, crawler loaders, crawler dozer, backhoe/loader, front end loader, scraper pan, monitor grader, skid steers, forklift, hydraulic excavator, specialty tracked equipment, gyrotracks with roller choppers, and other equipment. Do not place or operate logging decks within 186 feet of an active or inactive burrow, the area where tortoises normally forage from their burrows. Do not sheer, root-rake, disc, bed or create windrows in habitat occupied by tortoises, which is represented as a 2.5-acre area with a radius of 186 feet around any active burrow. **2) Chemical Treatment** - All motorized equipment should be kept a minimum of 4 Meters (13 ft.) from gopher tortoise burrows and herbicide applications should be conducted on foot. For foliar herbicide application to control shrubs and small hardwoods, use imazapyr, glyphosate, and/or triclopyr by directed ground spray if prescribed fire is not feasible or is ineffective due to inadequate fuel loads, unmanageable smoke hazards, prescribed fire permit bans and restrictions, or low expected mortality due to the size, density, and cover of shrubs and hardwoods. Do not aerially apply these or other herbicides. Revegetation - for artificial regeneration, do not plant more than 500 seedlings per acre. Design all practices in gopher tortoise habitat to minimize or avoid unintentional damage to non-target plants. This applies to all practices where vegetation is managed such as the use of herbicides or site prep/harvest equipment. 3) Road Repair and Culvert Placement/Debris removal: Equipment limitation mentioned above would apply to these restoration measures and management activities.

Species/Restoration Measure	Best Practice
Louisiana quillwort	If the restoration measure or management activity (i.e. mechanical or chemical treatment, road removal/repair, culvert placement and prescribed fire) will be conducted within 165 feet of Louisiana quillwort suitable habitat (ephemeral, intermittent, 1st and 2nd order perennial freshwater streams), then a qualified biologist will conduct a survey for Louisiana quillwort. If debris removal is in Louisiana quillwort suitable habitat, a survey will be performed prior to debris removal operations. If Louisiana quillwort is found, then the following protective measures should be adopted: No herbicides will be mixed or applied within 100 feet of Louisiana quillwort plants/colonies. Minimize turbidity and siltation from upstream and upslope land clearing activities. No land clearing will occur within 165 feet of streams containing Louisiana quillwort. Heavy equipment will not be used within a 165 ft. buffer area of Louisiana quillwort plants/colonies.
Mississippi Sandhill Crane	Species use habitat primarily for non-breeding season roosting and foraging and can leave the area during construction.
Piping Plover and Red Knot	Provide all individuals working on a restoration activities associated with the project with information in support of general awareness of piping plover or red knot presence and means to avoid birds and their critical or otherwise important habitats.
	Minimize vegetation planting in preferred habitats and avoid removal of wrack year-round along the shoreline.
Migratory Birds	Pre-work nesting surveys for migratory birds and raptors will be conducted and if evidence of nesting is found, resource managers will coordinate with USFWS Jackson, MS field office to develop appropriate conservation measures. These species are mobile and would likely exit the area during implementation of restoration measures and management activities (no impacts to overall population). The following best practices are contemplated and will be implemented to the extent practicable in order to avoid or minimize impacts to migratory bird species including bald eagles: • Use care to avoid birds when operating machinery or vehicles near birds. • Avoid working in migratory bird nesting habitats during breeding, nesting, and fledging (approximately mid-February through late August). If restoration measures or management activities must occur during this timeframe and breeding, nesting, or fledging birds are present, contact the state trust resource agency to obtain the most recent guidance to protect nesting birds or rookeries, and their recommendations will be implemented. • Conservation areas may already be marked to protect bird nesting areas. Stay out of existing marked areas. • If vegetation clearing is necessary, clear vegetation outside the migratory bird nesting season (approximately mid-February through late August) or have a qualified biologist inspect for active nests. If no active nests are found, vegetation may be removed. If active nests are found, vegetation may be removed after the nest successfully fledges.
Bald eagles	• If bald eagle breeding or nesting behaviors are observed or a nest is discovered or known, have all activities avoid the nest by a minimum of 660 feet. If the nest is protected by a vegetated buffer where there is no line of sight to the nest, then the minimum avoidance distance is 330 feet. Maintain this avoidance distance from the onset of breeding/courtship behaviors until any eggs have hatched and eaglets have fledged (approximately 6 months). • If a similar activity (such as driving on a roadway) is closer than 660 feet to a nest, maintain a distance buffer as close to the nest as the existing tolerated activity. If a vegetated buffer is present and there is no line of sight to the nest and a similar activity is closer than 330 feet to a nest, then maintain a distance buffer as close to the nest as the existing tolerated activity. • In some instances, activities conducted within 660 feet of a nest may result in disturbance. If an activity appears to cause initial disturbance, stop the activity and move all individuals and equipment away until the eagles are no longer displaying disturbance behaviors.
General Best Practices for Site-Specific Restoration Measures and Best Management Practices-Graveline Bay Land Acquisition and Management Project	
Chemical Treatment	For chemical treatment, personnel applying chemicals would follow all warning labels on chemical containers. Personnel will apply herbicide in accordance with the direction and guidance provided on the appropriate U.S. Environmental Protection Agency (EPA) labels and state statutes during land-based activities.
	Herbicides should not be applied within 60 feet of any endangered or threatened plant species (or plant species of concern), unless analysis indicates herbicide use is the best way to protect the species from invasive weeds or promote the species, and application methods are selective to the target plants being treated.
Prescribed Burn	Planning and implementation of prescribed burns should include measures to provide protection for known occurrences of threatened, endangered, sensitive, and locally rare species that are susceptible to damage or extirpation from fire injury.
All Restoration Measures	Erosion control measures should be applied in all ground-disturbing activities to reduce movement of bare soil and minimize direct delivery of sediment to streams or other water-bodies (including estuarine systems). Appropriate erosion control measures (installing water diversion, revegetation, mulch, silt fences, etc.) should be implemented as promptly as practical.

Species/Restoration Measure	Best Practice
	Planning and implementation of road repair and culvert placement, fire break construction, and other ground disturbing projects should include measures to provide protection for threatened, endangered, sensitive, and locally rare species that are susceptible to damage or extirpation from ground disturbance. These are referred to as “species sensitive to soil disturbance and species sensitive to recreational traffic.”
	Provide all individuals working on restoration activities associated with the project with information in support of general awareness of and means to avoid impacts to protected species and their habitats present at the specific project site.

Attachment C

ENVIRONMENTAL IMPACTS

Physical Environment

- Short-term minor impacts on geology and substrates from *access; chemical treatment of invasive species; and debris removal*;
- Short-term moderate impacts on geology and substrates from *mechanical treatment of invasive species, prescribed fire, and road repair/removal and culvert placement*;
- Short-term minor impacts on hydrology and water quality from *chemical treatment of invasive species*;
- Short-term moderate impacts on hydrology and water quality from *mechanical treatment of invasive species; prescribed fire; and road repair/removal and culvert placement;*
- No adverse impacts to floodplains;
- Short-term minor impacts on wetlands for *chemical treatment of invasive species and debris removal;*
- Short-term moderate impacts on wetlands for *mechanical treatment of invasive species, prescribed fire, and road repair/removal and culvert placement;*
- Short-term minor impacts on air quality and greenhouse gas emissions for *chemical or mechanical treatment of invasive species, debris removal, and road repair/removal and culvert placement;*
- Short-term minor impacts on air quality and greenhouse gas emissions for *prescribed fire*.

Biological Environment

- Short-term minor impacts on beach habitat from *access restriction and chemical treatment of invasive species;*
- Short-term minor impacts on beech-magnolia forest from *chemical treatment of invasive species, and debris removal*;
- Short-term minor impacts on fire-suppressed pine savannah from *chemical treatment of invasive species, and debris removal*;
- Short-term moderate impacts on fire-suppressed pine savannah from *mechanical treatment of invasive species, prescribed fire, road removal/repair and culvert placement;*
- Short-term minor impacts on coastal plain small stream forest from *chemical treatment of invasive species and debris removal*;
- Short-term moderate impacts on coastal plain small stream forest from *mechanical treatment of invasive species, and prescribed fire replacement;*
- Short-term minor impacts on wildlife species (including birds) from *chemical treatment of invasive species, and debris removal*;
- Short-term moderate impacts on wildlife species (including birds) from *chemical treatment of invasive species, debris removal and road removal/repair and culvert placement;*

- No adverse impacts from any other management or restoration activities on the biological environment.

Socioeconomic Environment

- Short-term minor impacts on Tourism and Recreational Use from *chemical treatment of invasive species, mechanical treatment of invasive species, and prescribed fire*;
- Short-term minor impacts on Public Health and Safety (including flood and shoreline protection) from *chemical treatment of invasive species and prescribed fire.*

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

Resource	Impact Duration	Impact Intensity Definitions		
		Minor	Moderate	Major
Physical Resources				
Geology and Substrates	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 to geology or soils could be readily apparent and result in changes to the soil character or local geologic characteristics. Erosion and compaction impacts could occur over local and immediately adjacent areas.	Disturbance could occur over a widespread area. Impacts to geology or soils could be readily apparent and could result in changes to the character of the geology or soils over a widespread area. Erosion and compaction could occur over a widespread area. Disruptions to substrates or soils may be permanent.
Hydrology and Water Quality	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 ground water 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. 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.	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 ground water flows. Water quality: Effects to water quality could be observable over a relatively large area. Impacts could result in a change to water quality that could be readily detectable and limited to local and adjacent areas. Change in water quality could persist; however, it could likely not exceed state water quality standards as required by the Clean Water Act. 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.	Hydrology: The effect on hydrology could be measurable and widespread. The effect could permanently alter hydrologic patterns including surface and ground water 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 impair designated uses of a water body. 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.

Resource	Impact Duration	Impact Intensity Definitions		
		Minor	**Moderate**	**Major**
Air Quality	Short-term: During construction period. Long-term: Over the life of the project or longer.	The impact on air quality may be measurable, but could be localized and temporary, such that the emissions do not exceed the Environmental Protection Agency's (EPA's) *de minimis* criteria for a general conformity determination under the Clean Air Act (40 CFR § 93.153).	The impact on air quality could be measurable and limited to local and adjacent areas. Emissions of criteria pollutants could be at EPA's *de minimis* criteria levels for general conformity determination.	The impact on air quality could be measurable over a widespread area. Emissions are high, such that they could exceed EPA's *de minimis criteria* for a general conformity determination.
Biological Resources				
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 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.	Impacts on native vegetation could be measureable but limited to local and adjacent areas. Occasional disturbance to individual plants could be expected. These disturbances could affect local populations negatively but could not be expected to affect regional population stability. Some impacts might occur in key habitats, but sufficient local habitat could retain function to maintain the viability of the species both locally and throughout its range. Opportunity for increased spread of non- native species could be detectable and limited to local and adjacent areas, but could only result in temporary changes to native species population and distributions.	Impacts on native vegetation could be measurable and widespread. Frequent disturbances of individual plants could be expected, with negative impacts to both local and regional population levels. These disturbances could negatively affect range- wide population stability. Some impacts might occur in key habitats, and habitat impacts could negatively affect the viability of the species both locally and throughout its range. Actions could result in the widespread increase of non- native species, resulting in broad and permanent changes to native 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 to native species, their habitats, or the natural processes sustaining them could be detectable, but localized, and could not measurably alter natural conditions. Infrequent responses to disturbance by some individuals could be expected, but without interference to feeding, reproduction, resting, migrating, or other factors affecting population levels. Small changes to local population numbers, population structure, and other demographic factors could occur. Sufficient habitat could remain functional at both the local and range- wide scales to maintain the viability of the species. 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.	Impacts on native species, their habitats, or the natural processes sustaining them could be measureable but limited to local and adjacent areas. Occasional responses to disturbance by some individuals could be expected, with some negative impacts to feeding, reproduction, resting, migrating, or other factors affecting local population levels. Some impacts might occur in key habitats. However, sufficient population numbers or habitat could retain function to maintain the viability of the species both locally and throughout its range. 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.	Impacts on native species, their habitats, or the natural processes sustaining them could be detectable and widespread. Frequent responses to disturbance by some individuals could be expected, with negative impacts to feeding, reproduction, migrating, or other factors resulting in a decrease in both local and range- wide population levels and habitat type. Impacts could occur during critical periods of reproduction or in key habitats and could result in direct mortality or loss of habitat that might affect the viability of a species. Local population numbers, population structure, and other demographic factors might experience large changes or declines. Actions could result in the widespread increase of non- native species resulting in broad and permanent changes to native species populations and distributions.

Resource	Impact Duration	Impact Intensity Definitions		
		Minor	**Moderate**	**Major**
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.
Socioeconomic Resources				
Socioeconomics and Environmental Justice[2]	Short-term: During construction period. Long-term: Over the life of the project or longer.	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. Actions could not disproportionately affect minority and low-income populations.	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. Actions could disproportionately affect minority and low-income populations. However, the impact could be temporary and localized.	A large number of individuals, groups, businesses, properties, or institutions could be affected. Impacts could be readily detectable and observed, extend over a widespread area, and have a substantial influence on social and/or economic conditions. 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.

[2] Evaluation of potential environmental justice issues will be fully addressed in future tied documents.

Resource	Impact Duration	Impact Intensity Definitions		
		Minor	Moderate	Major
Land and Marine Manage-ment	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 Recreation al Use	Short-term: During construction period. Long-term: Over the life of the project or longer.	There could be partial developed recreational site closures to protect public safety. The same 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.	There could be complete site closures to protect public safety. However, the sites could be reopened after activities occur. There could be slightly reduced site capacity. The visitor experience could be slightly changed but still available. 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.	All developed site capacity could be eliminated because developed facilities could be closed and removed. Visitors could be displaced to facilities over a widespread area and visitor experiences could no longer be available in many locations. 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.
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, ground water, and/or surface water contamination; 2) exposure of contaminated media to construction workers or transmission line operations personnel; and/or 3) mobilization and migration of contaminants currently in the soil, ground water, or surface water at levels that could harm the workers or general public. 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.	Project construction and operation could result in 1) exposure, mobilization and/or migration of existing contaminated soil, ground water, or surface water to an extent that requires mitigation; and/or 2) could introduce detectable levels of contaminants to soil, ground water, and/or surface water in localized areas within the project boundaries such that mitigation/remediation is required to restore the affected area to the preconstruction conditions. 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.	Actions could result in 1) soil, ground water, and/or surface water contamination at levels exceeding federal, state, or local hazardous waste criteria, including those established by 40 CFR § 261; 2) mobilization of contaminants currently in the soil, ground water, or surface water, resulting in exposure of humans or other sensitive receptors such as plants and wildlife to contaminant levels that could result in health effects; and 3) the presence of contaminated soil, ground water, or surface water within the project area, exposing workers and/or the public to contaminated or hazardous materials at levels exceeding those permitted by the federal Occupational Safety and Health Administration (OSHA) in 29 CFR § 1910. Increased risk of potential hazards to visitors, residents, and workers from decreased shoreline integrity could be substantial and could cause permanent changes in use patterns and area avoidance over a widespread area.

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Grand Bay Land Acquisition and Habitat Management

Environmental Evaluation Worksheet

MS TIG 2016-2017 RP/EA Environmental Evaluation Worksheet for Grand Bay Land Acquisition and Management[1]

A. Proposed Actions and Affected Habitat Types (Describe Restoration Measures and Management Activities Proposed on the Project Site)

Click here to enter text.

Potential Restoration Measures and Management Activities	Proposed Action (indicate with "x")	Treatment Area: Length	Treatment Area: Acres	Affected Area Habitat/Ecosystem	Comments
Chemical Treatment	Click here to enter text.	Click here to enter text.	Click here to enter text.	Click here to enter text.	Click here to enter text.
Mechanical Treatment	Click here to enter text.	Click here to enter text.	Click here to enter text.	Click here to enter text.	Click here to enter text.
Prescribed Fire	Click here to enter text.	Click here to enter text.	Click here to enter text.	Click here to enter text.	Click here to enter text.

1. Will the restoration measures and management activities be implemented consistent with the habitat types in the table below? (Check one)

   a. ☐Yes

   b. ☐No. Notify the TIG before taking further action.

Habitat	Chemical Treatment	Mechanical Treatment	Prescribed Fire
Forested Freshwater Scrub-Shrub	x	x	
Coastal Marsh	x	x	
Savannas and Flatwoods	x	x	x
Freshwater Marsh	x	x	

[1] The MS TIG has developed the Environmental Evaluation Worksheet in order to facilitate NEPA review of site-specific restoration measures and management activities as they are identified in the future. The Trustees may improve/revise the Environmental Evaluation Worksheet with future usage.

2. Best Practices

   a. Which of the applicable Best Practices listed in the Final RP/EA will be followed (Attachment A)? List them here.
      Click here to enter text.
   b. Identify any Best Practices or other mitigation measures not included in the Final RP/EA that will be implemented, including those associated with consultations (Attachment B) and required permits. List Best Practices and/or mitigation measures here:
      Click here to enter text.

B. Permits and Consultations

Authorization	**Authorization Name/Number**	**Date Issued/Anticipated**	**Notes**
CWA Section 404	Click here to enter text.	Click here to enter text.	Click here to enter text.
RHA Section 10	Click here to enter text.	Click here to enter text.	Click here to enter text.
Mississippi Department of Marine Resources Coastal Wetlands Authorization	Click here to enter text.	Click here to enter text.	Click here to enter text.
CWA Section 401-Water Quality Certification	Click here to enter text.	Click here to enter text.	Click here to enter text.

1. ESA

   a. Identify ESA-protected species and/or designated critical habitat on the parcel where work will be performed:
      Click here to enter text.
   b. Were all ESA-protected species and/or designated critical habitat, as well as the actions being proposed and their potential effects to protected species and/or critical habitat included in the Final RP/EA and consultation(s) or a subsequent consultation(s)? (Check one)
      i. ☐Yes. Insert date consultation completed: Click here to enter text..
      ii. ☐No. Consult with the MS TIG to determine if additional consultations are needed prior to approval to proceed.
   c. Will the applicable best practices and/or conservation measures be followed for all protected species and designated critical habitat that would be affected by the proposed action (Attachments A and B)?
      i. ☐Yes. Go to the next question.
      ii. ☐No. Consult with the MS TIG to determine if additional consultation(s) are needed prior to approval to proceed.

2. NHPA

Is the proposed action an undertaking with potential for adverse effects on resources protected by NHPA as determined by a qualified cultural resource specialist? (Check one)

a. ☐No. Go to the next question.
b. ☐Yes. Consult with the MS TIG to determine if additional consultation(s) will be needed prior to approval to proceed.

C. Environmental Impacts

Will the proposed restoration measures and management activities, when implemented with appropriate Best Practices, result in adverse effects to the ***physical, biological or socioeconomic environment*** that are less than or equal to the adverse effects identified in the 2016-2017 FRP/EA (Attachment C)?

(Check one)
1. ☐Yes.
2. ☐No. Notify the TIG of the before taking further action.

D. Finding (select one)

1. ☐The proposed actions and anticipated effects fall within scope of the Final MS TIG 2016-2017 RP/EA and no further analysis is required.
2. ☐The proposed actions and anticipated effects may not fall within the scope of the Final MS TIG 2016-2017 RP/EA and additional analysis may be required.

To the best of my knowledge, the information above is accurate and complete:

Click here to enter text. Click here to enter text.
Name (Planner(s) Name/Signature) Date

Submitted to Federal representative of MS TIG for review and concurrence on (Date:) Click here to enter text.

☐MS TIG Federal representative finds no further NEPA analysis is necessary.

☐MS TIG Federal representative finds additional NEPA analysis is necessary.

Click here to enter text. Click here to enter text.
Signature (Federal representative(s) of the MS TIG) Date

Attachment A

BEST PRACTICES

Physical Environment

Geology and Substrates

- Allow revegetation of fire breaks or actively revegetate with native species or annual grasses, if prolonged period of greening up is anticipated.
- Develop and implement spill prevention and response plan, including conducting daily inspections during chemical treatment, mechanical treatment and prescribed fire operations to ensure there are no leaks of antifreeze, hydraulic fluid, pesticides or other substances.
- To the extent practicable, for equipment use in wet areas, soft tracked or wide tracked equipment should be used to distribute the equipment weight and minimize impacts to soils. Alternatively, crews may remove vegetative material with chainsaws.

Hydrology and Water Quality

- In the execution of land acquisition and the design of habitat management measures the MS TIG would consider resiliency measures to facilitate habitat migration due to sea level rise.
- Develop and implement an erosion control plan to minimize erosion during and after construction and where possible use vegetative buffers (100 feet or greater), revegetate with native species or annual grasses, and to the extent practicable, conduct work during dry seasons.
- For chemical treatment, personnel applying chemicals would follow all warning labels on chemical containers and proper permits would be secured prior to treatment activities. Personnel will apply herbicide in accordance with the direction and guidance provided on the appropriate U.S. Environmental Protection Agency (EPA) labels and state statutes during land-based activities.
- Soft track or wide track equipment would be used in wet areas to the extent practicable. Alternatively, crews may remove vegetative material with chainsaws.
- Avoid and minimize, to the maximum extent practicable, placement of dredged or fill material in wetlands and other aquatic resources. Design construction equipment corridors to avoid and minimize impacts to wetlands and other aquatic resources to the maximum extent practicable. If required, a USACE permit and/or MDMR Coastal Wetlands Permit would be obtained; likely a Nationwide 27 (Aquatic Habitat Restoration, Establishment, and Enhancement Activities) as well as MDMR Coastal Wetlands Permit (if required). USACE permit and/or MDMR Coastal Wetlands permit conditions (if required) would be adhered to in all operations.
- Designate a vehicle staging area removed from any natural surface water resource or wetland to perform fueling, maintenance, and storage of construction vehicles and equipment. Inspect vehicles and equipment daily prior to leaving the storage area to ensure that no petroleum or oil products are leaking.
- Develop and implement a spill prevention and response plan, including conducting daily inspections of all construction and related equipment to ensure there are no leaks of

antifreeze, hydraulic fluid, or other substances and cleaning and sealing all equipment that would be used in the water to rid it of chemical residue.
- Control dust related to construction site activities through a Soil Erosion Sediment Control Plan that includes spraying of a suppressing agent on dust piles (non-hazardous, biodegradable).
- Cover trucks hauling loose materials.

Air Quality and Greenhouse Gas Emissions

- Shut down idling construction equipment, if feasible.
- Encourage the use of the proper size of equipment for the job to maximize energy efficiency.
- Use of ultra-low sulfur diesel fuel in off-road construction equipment with engine horsepower (HP) rating of 60 HP and above.

Biological Environment

Habitats (Invasive Species Control)

- Prior to bringing any equipment (including personal gear, machinery, vehicles, or vessels) to the work site, inspect each item for mud or soil, seeds, and vegetation. If present, clean the equipment, vehicles, or personal gear until they are free from mud, soil, seeds, and vegetation.
- Inspect the equipment, vehicles, and personal gear each time they are being prepared to go to a site or prior to transferring between sites to avoid spreading exotic, nuisance species.

Migratory Birds and Bald Eagles

Migratory Birds
- Use care to avoid birds when operating machinery or vehicles near birds.
- Avoid working in migratory bird nesting habitats during breeding, nesting, and fledging (approximately mid-February through late August). If proposed alternative activities must occur during this timeframe and breeding, nesting, or fledging birds are present, contact the state trust resource agency to obtain the most recent guidance to protect nesting birds or rookeries, and their recommendations will be implemented.
- Conservation areas may already be marked to protect bird nesting areas. Stay out of existing marked areas.
- If vegetation clearing is necessary, clear vegetation outside the migratory bird nesting season (approximately mid-February through late August) or have a qualified biologist inspect for active nests. If no active nests are found, vegetation may be removed. If active nests are found, vegetation may be removed after the nest successfully fledges.

Bald Eagles
- If bald eagle breeding or nesting behaviors are observed or a nest is discovered or known, have all activities avoid the nest by a minimum of 660 feet. If the nest is protected by a vegetated buffer where there is *no* line of sight to the nest, then the minimum avoidance distance is 330 feet. Maintain this avoidance distance from the onset of breeding/courtship behaviors until any eggs have hatched and eaglets have fledged (approximately 6 months).
- If a similar activity (such as driving on a roadway) is closer than 660 feet to a nest, maintain a distance buffer as close to the nest as the existing tolerated activity. If a vegetated buffer is

present and there is no line of sight to the nest and a similar activity is closer than 330 feet to a nest, then maintain a distance buffer as close to the nest as the existing tolerated activity.

- In some instances, activities conducted within 660 feet of a nest may result in disturbance, particularly for the eagles occupying the Mississippi barrier islands. If an activity appears to cause initial disturbance, stop the activity and move all individuals and equipment away until the eagles are no longer displaying disturbance behaviors. Contact the USFWS's Migratory Bird Permit Office to determine how to avoid impacts or if a permit may be needed.

Attachment B

Grand Bay Land Acquisition and Habitat Management Best Practices Summary Table

Species/ Restoration Measure	Best Practice
	Best Practice for Protected Species That Could Occur in the Grand Bay Land Acquisition and Habitat Management Project
Alabama Red-Belly Turtle	Surveys will be conducted in potential habitat. Survey results will be considered in the design of the restoration measures and management activities to either avoid or minimize impacts to the species. Best management practices outlined in applicable erosion control plans and applicable spill prevention plans will be implemented to minimize the indirect impacts.
Black pine snake	Exemptions under Section 4(d) of the Endangered Species Act allow the following management activities within habitats occupied by the black pinesnake: (1) Prescribed burning, including all fire break establishment and maintenance actions, as well as actions taken to control wildfires; (2) Herbicide application for invasive plant species control, site-preparation, and mid-story and understory woody vegetation control. All exempted herbicide applications must be conducted in a manner consistent with Federal law, including Environmental Protection Agency label restrictions; applicable State laws; and herbicide application guidelines as prescribed by herbicide manufacturers and ; (3) All forest management activities that maintain lands in a forested condition, except for: (a) Conversion of longleaf-pine-dominated forests (>51 percent longleaf in the overstory) to other forest cover types or land uses; or (b) those activities causing significant subsurface disturbance, including, but not limited to, shearing, wind-rowing, stumping, disking (except during fire break creation or maintenance), root-raking, and bedding. Areas requiring mechanical treatment such as shearing, wind-rowing, stumping, disking, root raking and bedding are typically dominated by invasives woody shrub and tree species and are not suitable habitat (open canopy settings) for blackpine snake. An assessment of habitat would be completed. Surveys would be conducted of areas that have potential black pine snake habitat. The results would be considered in the design of the management and or restoration measures to avoid or minimize impacts to the species. The Implementing Trustee would coordinate with the Jackson Field Offices if help is needed on habitat identification of habitat, conducting of surveys and/or the development of practices on a site-specific restoration plan.
Gopher tortoise	A qualified biologist will conduct gopher tortoise surveys in areas that have suitable habitat and if burrows are identified, the following conservation measures will be implemented to avoid or minimize impacts: **1) Mechanical Treatment** - To the extent practicable, vegetation clearing within 13 feet of a gopher tortoise burrow would be conducted but with hand tools (i.e., weed trimmer, push mower, chainsaws). In specific cases where the hand tool restriction imposes additional costs and time required to maintain mowed areas, the specific provisions for mowing operations with bush-hog or rotary cutters within 13 feet of active and inactive gopher tortoise burrows during the dormant season only (October through April) are as follows: the path of the tractor and mower will be directed so that tires do not cross directly over the burrow entrance, or plane of the underground burrow. However, tractors and mowers of sufficient width can be backed or pulled directly over the burrow apron, entrance, and its underground plane by straddling the wheels on either side of the burrow and apron. Whenever possible, mowing should be conducted in the winter to reduce the likelihood of gopher tortoises being active above ground. If practical, mowing should be planned for cloudy days when the temperatures are coolest. Heavy equipment will stay 14 M (13 ft) from known gopher tortoise burrows. Heavy equipment includes tractors, crawler loaders, crawler dozer, backhoe/loader, front end loader, scraper pan, monitor grader, skid steers, forklift, hydraulic excavator, specialty tracked equipment, gyrotracks with roller choppers, and other equipment. Do not place or operate logging decks within 186 feet of an active or inactive burrow, the area where tortoises normally forage from their burrows. Do not sheer, root-rake, disc, bed or create windrows in habitat occupied by tortoises, which is represented as a 2.5-acre area with a radius of 186 feet around any active burrow. **2) Chemical Treatment** - All motorized equipment should be kept a minimum of 4 Meters (13 ft.) from gopher tortoise burrows and herbicide applications should be conducted on foot. For foliar herbicide application to control shrubs and small hardwoods, use imazapyr, glyphosate, and/or triclopyr by directed ground spray if prescribed fire is not feasible or is ineffective due to inadequate fuel loads, unmanageable smoke hazards, prescribed fire permit bans and restrictions, or low expected mortality due to the size, density, and cover of shrubs and hardwoods. Do not aerially apply these or other herbicides. Revegetation - for artificial regeneration, do not plant more than 500 seedlings per acre. Design all practices in gopher tortoise habitat to minimize or avoid unintentional damage to non-target plants. This applies to all practices where vegetation is managed such as the use of herbicides or site prep/harvest equipment.

Species/ Restoration Measure	Best Practice
	Best Practice for Protected Species That Could Occur in the Grand Bay Land Acquisition and Habitat Management Project
Louisiana quillwort	If the restoration measure or management activity (i.e. mechanical or chemical treatment, and prescribed fire) will be conducted within 165 feet of Louisiana quillwort suitable habitat (ephemeral, intermittent, 1st and 2nd order perennial freshwater streams), then a qualified biologist will conduct a survey for Louisiana quillwort. If Louisiana quillwort is found, then the following protective measures should be adopted: No herbicides will be mixed or applied within 100 feet of Louisiana quillwort plants/colonies. Minimize turbidity and siltation from upstream and upslope land clearing activities. No land clearing will occur within 165 feet of streams containing Louisiana quillwort. Heavy equipment will not be used within a 165 ft. buffer area of Louisiana quillwort plants/colonies.
Mississippi Sandhill Crane	Species use habitat primarily for non-breeding season roosting and foraging and can leave the area during construction.
Piping Plover and Red Knot	Provide all individuals working on a restoration activities associated with the project with information in support of general awareness of piping plover or red knot presence and means to avoid birds and their critical or otherwise important habitats.
	Minimize vegetation planting in preferred habitats and avoid removal of wrack year-round along the shoreline.
Red-Cockaded Woodpecker	Avoid working within active red-cockaded woodpecker clusters (the minimum convex polygon containing the aggregation of cavity trees used by a group of red-cockaded woodpeckers and a 200- foot-wide buffer surrounding the polygon).
	If avoidance is not possible or management activities in red-cockaded woodpecker suitable habitat are desired, conduct standard surveys to determine if the habitat is supporting any individuals or presence can be assumed. If red-cockaded woodpeckers are present (or assumed to be), avoid cavity trees and use of mechanized equipment during the non-nesting season (approximately April 1 through July 31)
	If tree removal is necessary, survey pine trees approximately 60 or more years old for active cavities within one year of the proposed removal. Extend surveys from the project site out to no less than one-half mile. Replace any cavities affected by the project by drilled cavity construction.
	If impacts to suitable foraging habitat (pines approximately 30 or more years old and within one-half mile of an active cavity tree) are proposed, conduct a foraging habitat analysis. Foraging habitat may need to be replanted post-project.
	Design projects within red-cockaded woodpecker suitable habitat such that prescribed fire needs are not impeded.
Wood Stork	Species use habitat primarily for non-breeding season roosting and foraging and can leave the area during construction.
Migratory Birds	Pre-work nesting surveys for migratory birds and raptors will be conducted and if evidence of nesting is found, resource managers will coordinate with USFWS Jackson, MS field office to develop appropriate conservation measures. These species are mobile and would likely exit the area during implementation of restoration measures and management activities (no impacts to overall population). The following best practices will be implemented to the extent practicable in order to avoid or minimize impacts to migratory bird species including bald eagles: • Use care to avoid birds when operating machinery or vehicles near birds. • Avoid working in migratory bird nesting habitats during breeding, nesting, and fledging (approximately mid-February through late August). If restoration measures or management activities must occur during this timeframe and breeding, nesting, or fledging birds are present, contact the state trust resource agency to obtain the most recent guidance to protect nesting birds or rookeries, and their recommendations will be implemented. • Conservation areas may already be marked to protect bird nesting areas. Stay out of existing marked areas. • If vegetation clearing is necessary, clear vegetation outside the migratory bird nesting season (approximately mid-February through late August) or have a qualified biologist inspect for active nests. If no active nests are found, vegetation may be removed. If active nests are found, vegetation may be removed after the nest successfully fledges.

Species/ Restoration Measure	Best Practice
Best Practice for Protected Species That Could Occur in the Grand Bay Land Acquisition and Habitat Management Project	
Bald eagles	• If bald eagle breeding or nesting behaviors are observed or a nest is discovered or known, have all activities avoid the nest by a minimum of 660 feet. If the nest is protected by a vegetated buffer where there is no line of sight to the nest, then the minimum avoidance distance is 330 feet. Maintain this avoidance distance from the onset of breeding/courtship behaviors until any eggs have hatched and eaglets have fledged (approximately 6 months). • If a similar activity (such as driving on a roadway) is closer than 660 feet to a nest, maintain a distance buffer as close to the nest as the existing tolerated activity. If a vegetated buffer is present and there is no line of sight to the nest and a similar activity is closer than 330 feet to a nest, then maintain a distance buffer as close to the nest as the existing tolerated activity. • In some instances, activities conducted within 660 feet of a nest may result in disturbance. If an activity appears to cause initial disturbance, stop the activity and move all individuals and equipment away until the eagles are no longer displaying disturbance behaviors.
General Best Practices for Site-Specific Restoration Measures and Best Management Practices-Grand Bay Land Acquisition and Habitat Management Project	
Chemical Treatment	For chemical treatment, personnel applying chemicals would follow all warning labels on chemical containers. Personnel will apply herbicide in accordance with the direction and guidance provided on the appropriate U.S. Environmental Protection Agency (EPA) labels and state statutes during land-based activities.
	Herbicides should not be applied within 60 feet of any endangered or threatened plant species (or plant species of concern), unless analysis indicates herbicide use is the best way to protect the species from invasive weeds or promote the species, and application methods are selective to the target plants being treated.
Prescribed Burn	Planning and implementation of prescribed burns should include measures to provide protection for known occurrences of threatened, endangered, sensitive, and locally rare species that are susceptible to damage or extirpation from fire injury.
All Restoration Measures	Erosion control measures should be applied in all ground-disturbing activities to reduce movement of bare soil and minimize direct delivery of sediment to streams or other water-bodies (including estuarine systems). Appropriate erosion control measures (installing water diversion, revegetation, mulch, silt fences, etc.) should be implemented as promptly as practical.
	Planning and implementation of fire break construction, and other ground disturbing projects should include measures to provide protection for threatened, endangered, sensitive, and locally rare species that are susceptible to damage or extirpation from ground disturbance. These are referred to as “species sensitive to soil disturbance and species sensitive to recreational traffic.”
	Provide all individuals working on restoration activities associated with the project with information in support of general awareness of and means to avoid impacts to protected species and their habitats present at the specific project site.

Attachment C

ENVIRONMENTAL IMPACTS

Physical Environment

- Short-term minor impacts on geology and substrates from *acquisition/preservation and chemical treatment of invasive species;*
- Short-term minor to moderate impacts on geology and substrates from *mechanical treatment of invasive species, prescribed fire*;
- Short-term minor impacts on hydrology and water quality from *chemical treatment of invasive species*;
- Short-term minor to moderate impacts on hydrology and water quality from *mechanical treatment of invasive species and prescribed fire;* no adverse impacts to floodplains;
- Short-term minor impacts on wetlands for *chemical treatment of invasive species;*
- Short-term minor to moderate impacts on wetlands for *mechanical treatment of invasive species and prescribed fire;* short-term minor impacts on air quality and greenhouse gas emissions for *chemical or mechanical treatment of invasive species;*
- Short-term moderate impacts on air quality and greenhouse gas emissions for *prescribed fire*.

Biological Environment

- Short-term minor impacts on forested freshwater scrub-shrub, coastal marsh, and freshwater marsh from *chemical or mechanical treatment of invasive species*;
- Short-term minor to moderate impacts on savannas and flatwoods from *mechanical treatment of invasive species, and prescribed fire*;
- Short-term minor to moderate impacts on wildlife species (including birds) from *chemical or mechanical treatment of invasive species, and prescribed fire*;
- No adverse impacts from any other management or restoration activities on the biological environment.

Socioeconomic Environment

- Short-term minor impacts on Tourism and Recreational Use from *chemical treatment of invasive species, mechanical treatment of invasive species, and prescribed fire*;
- Short-term minor impacts on Public Health and Safety (including flood and shoreline protection) from *chemical treatment of invasive species and prescribed fire.*

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

Resource	Impact Duration	Impact Intensity Definitions		
		Minor	**Moderate**	**Major**
Physical Resources				
Geology and Substrates	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 to geology or soils could be readily apparent and result in changes to the soil character or local geologic characteristics. Erosion and compaction impacts could occur over local and immediately adjacent areas.	Disturbance could occur over a widespread area. Impacts to geology or soils could be readily apparent and could result in changes to the character of the geology or soils over a widespread area. Erosion and compaction could occur over a widespread area. Disruptions to substrates or soils may be permanent.
Hydrology and Water Quality	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 ground water 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. 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.	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 ground water flows. Water quality: Effects to water quality could be observable over a relatively large area. Impacts could result in a change to water quality that could be readily detectable and limited to local and adjacent areas. Change in water quality could persist; however, it could likely not exceed state water quality standards as required by the Clean Water Act. 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.	Hydrology: The effect on hydrology could be measurable and widespread. The effect could permanently alter hydrologic patterns including surface and ground water 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 impair designated uses of a water body. 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.

<table>
<tr><th rowspan="2">Resource</th><th rowspan="2">Impact Duration</th><th colspan="3">Impact Intensity Definitions</th></tr>
<tr><th>Minor</th><th>Moderate</th><th>Major</th></tr>
<tr><td>Air Quality</td><td>Short-term: During construction period.
Long-term: Over the life of the project or longer.</td><td>The impact on air quality may be measurable, but could be localized and temporary, such that the emissions do not exceed the Environmental Protection Agency's (EPA's) de minimis criteria for a general conformity determination under the Clean Air Act (40 CFR § 93.153).</td><td>The impact on air quality could be measurable and limited to local and adjacent areas. Emissions of criteria pollutants could be at EPA's de minimis criteria levels for general conformity determination.</td><td>The impact on air quality could be measurable over a widespread area. Emissions are high, such that they could exceed EPA's de minimis criteria for a general conformity determination.</td></tr>
<tr><td colspan="5">Biological Resources</td></tr>
<tr><td>Habitats</td><td>Short-term: Lasting less than two growing seasons.
Long-term: Lasting longer than two growing seasons.</td><td>Impacts on native vegetation may be detectable, but could not alter natural conditions and could be limited to localized areas. Infrequent disturbance to individual plants could be expected, but would not affect local or range-wide population stability.
Infrequent or insignificant one-time disturbance to locally suitable habitat could occur, but sufficient habitat could remain functional at both the local and regional scales to maintain the viability of the species.
Opportunity for increased spread of non- native species could be detectable but temporary and localized and could not displace native species populations and distributions.</td><td>Impacts on native vegetation could be measureable but limited to local and adjacent areas. Occasional disturbance to individual plants could be expected. These disturbances could affect local populations negatively but could not be expected to affect regional population stability. Some impacts might occur in key habitats, but sufficient local habitat could retain function to maintain the viability of the species both locally and throughout its range.
Opportunity for increased spread of non- native species could be detectable and limited to local and adjacent areas, but could only result in temporary changes to native species population and distributions.</td><td>Impacts on native vegetation could be measurable and widespread. Frequent disturbances of individual plants could be expected, with negative impacts to both local and regional population levels. These disturbances could negatively affect range-wide population stability. Some impacts might occur in key habitats, and habitat impacts could negatively affect the viability of the species both locally and throughout its range.
Actions could result in the widespread increase of non-native species, resulting in broad and permanent changes to native species populations and distributions.</td></tr>
</table>

Resource	Impact Duration	Impact Intensity Definitions		
		Minor	**Moderate**	**Major**
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 to native species, their habitats, or the natural processes sustaining them could be detectable, but localized, and could not measurably alter natural conditions. Infrequent responses to disturbance by some individuals could be expected, but without interference to feeding, reproduction, resting, migrating, or other factors affecting population levels. Small changes to local population numbers, population structure, and other demographic factors could occur. Sufficient habitat could remain functional at both the local and range-wide scales to maintain the viability of the species. 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.	Impacts on native species, their habitats, or the natural processes sustaining them could be measureable but limited to local and adjacent areas. Occasional responses to disturbance by some individuals could be expected, with some negative impacts to feeding, reproduction, resting, migrating, or other factors affecting local population levels. Some impacts might occur in key habitats. However, sufficient population numbers or habitat could retain function to maintain the viability of the species both locally and throughout its range. 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.	Impacts on native species, their habitats, or the natural processes sustaining them could be detectable and widespread. Frequent responses to disturbance by some individuals could be expected, with negative impacts to feeding, reproduction, migrating, or other factors resulting in a decrease in both local and range-wide population levels and habitat type. Impacts could occur during critical periods of reproduction or in key habitats and could result in direct mortality or loss of habitat that might affect the viability of a species. Local population numbers, population structure, and other demographic factors might experience large changes or declines. Actions could result in the widespread increase of non-native species resulting in broad and permanent changes to native species populations and distributions.
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.

Resource	Impact Duration	Impact Intensity Definitions		
		Minor	Moderate	Major
Socioeconomic Resources				
Socioeco-nomics and Environ-mental Justice[2]	Short-term: During construction period. Long-term: Over the life of the project or longer.	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. Actions could not disproportionately affect minority and low-income populations.	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. Actions could disproportionately affect minority and low-income populations. However, the impact could be temporary and localized.	A large number of individuals, groups, businesses, properties, or institutions could be affected. Impacts could be readily detectable and observed, extend over a widespread area, and have a substantial influence on social and/or economic conditions. 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.
Land and Marine Managem ent	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 Recreatio nal Use	Short-term: During construction period. Long-term: Over the life of the project or longer.	There could be partial developed recreational site closures to protect public safety. The same 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.	There could be complete site closures to protect public safety. However, the sites could be reopened after activities occur. There could be slightly reduced site capacity. The visitor experience could be slightly changed but still available. 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.	All developed site capacity could be eliminated because developed facilities could be closed and removed. Visitors could be displaced to facilities over a widespread area and visitor experiences could no longer be available in many locations. 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.

[2] Evaluation of potential environmental justice issue will be fully addressed in future tiered documents.

Resource	Impact Duration	Impact Intensity Definitions		
		Minor	Moderate	Major
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, ground water, and/or surface water contamination; 2) exposure of contaminated media to construction workers or transmission line operations personnel; and/or 3) mobilization and migration of contaminants currently in the soil, ground water, or surface water at levels that could harm the workers or general public. 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.	Project construction and operation could result in 1) exposure, mobilization and/or migration of existing contaminated soil, ground water, or surface water to an extent that requires mitigation; and/or 2) could introduce detectable levels of contaminants to soil, ground water, and/or surface water in localized areas within the project boundaries such that mitigation/remediation is required to restore the affected area to the preconstruction conditions. 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.	Actions could result in 1) soil, ground water, and/or surface water contamination at levels exceeding federal, state, or local hazardous waste criteria, including those established by 40 CFR § 261; 2) mobilization of contaminants currently in the soil, ground water, or surface water, resulting in exposure of humans or other sensitive receptors such as plants and wildlife to contaminant levels that could result in health effects; and 3) the presence of contaminated soil, ground water, or surface water within the project area, exposing workers and/or the public to contaminated or hazardous materials at levels exceeding those permitted by the federal Occupational Safety and Health Administration (OSHA) in 29 CFR § 1910. Increased risk of potential hazards to visitors, residents, and workers from decreased shoreline integrity could be substantial and could cause permanent changes in use patterns and area avoidance over a widespread area.

Upper Pascagoula Water Quality Enhancement

Environmental Evaluation Worksheet

U.S. Department of Agriculture Natural Resources Conservation Service	NRCS-CPA-52 4/2013	**A. Client Name:**
ENVIRONMENTAL EVALUATION WORKSHEET		**B. Conservation Plan ID #** (as applicable): **Program Authority** (optional):
D. Client's Objective(s) (purpose):		**C. Identification #** (farm, tract, field #, etc. as required):

E. Need for Action:	**H. Alternatives**		
	No Action √ if RMS ☐	***Alternative 1*** √ if RMS ☐	***Alternative 2*** √ if RMS ☐

Resource Concerns

In Section "F" below, analyze, record, and address concerns identified through the Resources Inventory process. (See FOTG Section III - Resource Planning Criteria for guidance).

F. Resource Concerns and Existing/ Benchmark Conditions (Analyze and record the existing/benchmark conditions for each identified concern)	**I. Effects of Alternatives**					
	No Action		***Alternative 1***		***Alternative 2***	
	Amount, Status, Description *(Document both short and long term impacts)*	**√ if does NOT meet PC**	**Amount, Status, Description** *(Document both short and long term impacts)*	**√ if does NOT meet PC**	**Amount, Status, Description** *(Document both short and long term impacts)*	**√ if does NOT meet PC**
SOIL: *EROSION*						
		☐ NOT meet PC		☐ NOT meet PC		☐ NOT meet PC
		☐ NOT meet PC		☐ NOT meet PC		☐ NOT meet PC
SOIL: *SOIL QUALITY DEGRADATION*						
		☐ NOT meet PC		☐ NOT meet PC		☐ NOT meet PC
		☐ NOT meet PC		☐ NOT meet PC		☐ NOT meet PC
WATER: *EXCESS / INSUFFICIENT WATER*						
		☐ NOT meet PC		☐ NOT meet PC		☐ NOT meet PC
WATER: *WATER QUALITY DEGRADATION*						
		☐ NOT meet PC		☐ NOT meet PC		☐ NOT meet PC
		☐ NOT meet PC		☐ NOT meet PC		☐ NOT meet PC

F. Resource Concerns and Existing/ Benchmark Conditions (Analyze and record the existing/benchmark conditions for each identified concern)	I. (continued)					
	No Action		***Alternative 1***		***Alternative 2***	
	Amount, Status, Description *(Document both short and long term impacts)*	**√ if does NOT meet PC**	**Amount, Status, Description** *(Document both short and long term impacts)*	**√ if does NOT meet PC**	**Amount, Status, Description** *(Document both short and long term impacts)*	**√ if does NOT meet PC**
AIR: *AIR QUALITY IMPACTS*						
		☐ NOT meet PC		☐ NOT meet PC		☐ NOT meet PC
		☐ NOT meet PC		☐ NOT meet PC		☐ NOT meet PC
PLANTS: *DEGRADED PLANT CONDITION*						
		☐ NOT meet PC		☐ NOT meet PC		☐ NOT meet PC
		☐ NOT meet PC		☐ NOT meet PC		☐ NOT meet PC
ANIMALS: *INADEQUATE HABITAT FOR FISH AND WILDLIFE*						
		☐ NOT meet PC		☐ NOT meet PC		☐ NOT meet PC
ANIMALS: *LIVESTOCK PRODUCTION LIMITATION*						
		☐ NOT meet PC		☐ NOT meet PC		☐ NOT meet PC
		☐ NOT meet PC		☐ NOT meet PC		☐ NOT meet PC
ENERGY: *INEFFICIENT ENERGY USE*						
		☐ NOT meet PC		☐ NOT meet PC		☐ NOT meet PC
		☐ NOT meet PC		☐ NOT meet PC		☐ NOT meet PC
HUMAN: *ECONOMIC AND SOCIAL CONSIDERATIONS*						

Special Environmental Concerns: Environmental Laws, Executive Orders, policies, etc.						
In Section "G" complete and attach Environmental Procedures Guide Sheets for documentation as applicable. Items with a "●" may require a federal permit or consultation/coordination between the lead agency and another government agency. In these cases, effects may need to be determined in consultation with another agency. Planning and practice implementation may proceed for practices not involved in consultation.						
G. Special Environmental Concerns (Document existing/ benchmark conditions)	**J. Impacts to Special Environmental Concerns**					
	No Action		***Alternative 1***		***Alternative 2***	
	Document all impacts (Attach Guide Sheets as applicable)	√ if needs further action	Document all impacts (Attach Guide Sheets as applicable)	√ if needs further action	Document all impacts (Attach Guide Sheets as applicable)	√ if needs further action
●Clean Air Act *Guide Sheet* *FS1* *FS-2*		☐		☐		☐
●Clean Water Act / Waters of the U.S. *Guide Sheet* *Fact Sheet*		☐		☐		☐
●Coastal Zone Management *Guide Sheet* *Fact Sheet*		☐		☐		☐
Coral Reefs *Guide Sheet* *Fact Sheet*		☐		☐		☐
●Cultural Resources / Historic Properties *Guide Sheet* *Fact Sheet*		☐		☐		☐
●Endangered and Threatened Species *Guide Sheet* *Fact Sheet*		☐		☐		☐
Environmental Justice *Guide Sheet* *Fact Sheet*		☐		☐		☐
●Essential Fish Habitat *Guide Sheet* *Fact Sheet*		☐		☐		☐
Floodplain Management *Guide Sheet* *Fact Sheet*		☐		☐		☐
Invasive Species *Guide Sheet* *Fact Sheet*		☐		☐		☐
●Migratory Birds/Bald and Golden Eagle Protection Act *Guide Sheet* *Fact Sheet*		☐		☐		☐
Natural Areas *Guide Sheet* *Fact Sheet*		☐		☐		☐
Prime and Unique Farmlands *Guide Sheet* *Fact Sheet*		☐		☐		☐
Riparian Area *Guide Sheet* *Fact Sheet*		☐		☐		☐
Scenic Beauty *Guide Sheet* *Fact Sheet*		☐		☐		☐

•Wetlands *Guide Sheet* *Fact Sheet*		☐		☐		☐
•Wild and Scenic Rivers *Guide Sheet* *Fact Sheet*		☐		☐		☐

K. Other Agencies and Broad Public Concerns	***No Action***	***Alternative 1***	***Alternative 2***
Easements, Permissions, Public Review, or Permits Required and Agencies Consulted.			
Cumulative Effects Narrative (Describe the cumulative impacts considered, including past, present and known future actions regardless of who performed the actions)			
L. Mitigation (Record actions to avoid, minimize, and compensate)			
M. Preferred Alternative — √ preferred alternative	☐	☐	☐
Supporting reason			

N. Context (Record context of alternatives analysis)

The significance of an action must be analyzed in several contexts such as society as a whole (human, national), the affected region, the affected interests, and the locality.

O. Determination of Significance or Extraordinary Circumstances

Intensity: Refers to the severity of impact. Impacts may be both beneficial and adverse. A significant effect may exist even if the Federal agency believes that on balance the effect will be beneficial. Significance cannot be avoided by terming an action temporary or by breaking it down into small component parts.

If you answer ANY of the below questions "yes" then contact the State Environmental Liaison as there may be extraordinary circumstances and significance issues to consider and a site specific NEPA analysis may be required.

Yes	No	
☐	☐	• Is the preferred alternative expected to cause significant effects on public health or safety?
☐	☐	• Is the preferred alternative expected to significantly affect unique characteristics of the geographic area such as proximity to historic or cultural resources, park lands, prime farmlands, wetlands, wild and scenic rivers, or ecologically critical areas?
☐	☐	• Are the effects of the preferred alternative on the quality of the human environment likely to be highly controversial?
☐	☐	• Does the preferred alternative have highly uncertain effects or involve unique or unknown risks on the human environment?
☐	☐	• Does the preferred alternative establish a precedent for future actions with significant impacts or represent a decision in principle about a future consideration?
☐	☐	• Is the preferred alternative known or reasonably expected to have potentially significant environment impacts to the quality of the human environment either individually or cumulatively over time?
☐	☐	• Will the preferred alternative likely have a significant adverse effect on ANY of the special environmental concerns? Use the Evaluation Procedure Guide Sheets to assist in this determination. This includes, but is not limited to, concerns such as cultural or historical resources, endangered and threatened species, environmental justice, wetlands, floodplains, coastal zones, coral reefs, essential fish habitat, wild and scenic rivers, clean air, riparian areas, natural areas, and invasive species.
☐	☐	• Will the preferred alternative threaten a violation of Federal, State, or local law or requirements for the protection of the environment?

P. To the best of my knowledge, the data shown on this form is accurate and complete:

In the case where a non-NRCS person (e.g. another MS TIG Trustee) assists with planning they are to sign the first signature block and then NRCS is to sign the second block to verify the information's accuracy.

Signature (TSP if applicable)	**Title**	**Date**
Signature (NRCS)	**Title**	**Date**

If preferred alternative is not a federal action where NRCS has control or responsibility and this NRCS-CPA-52 is shared with someone other than the client then indicate to whom this is being provided.

The following sections are to be completed by the Responsible Federal Official (RFO)		
NRCS is the RFO if the action is lead federal agency for NRDA-funded actions planned by NRCS.		
Q. NEPA Compliance Finding (check one) **The preferred alternative:**		**Action required**
☐	1) is a federal action that has been sufficiently analyzed in an existing NEPA document to which this environmental evaluation is tiered because the expected effects are within the range of those described in the applicable NEPA document and there are no predicted significant adverse environmental effects or extraordinary circumstances.	Document in "R.1" below. No additional analysis is required.
☐	2) is a federal action that has **NOT** been sufficiently analyzed or may involve predicted significant adverse environmental effects or extraordinary circumstances and may require an EA or EIS.	Contact the State Environmental Liaison. Further NEPA analysis required.
R. Rationale Supporting the Finding		
R.1 Findings Documentation		

I have considered the effects of the alternatives on the Resource Concerns, Economic and Social Considerations, Special Environmental Concerns, and Extraordinary Circumstances as defined by Agency regulation and policy and based on that made the finding indicated above.

S. Signature of Responsible Federal Official:

Signature	**Title**	**Date**

Additional notes

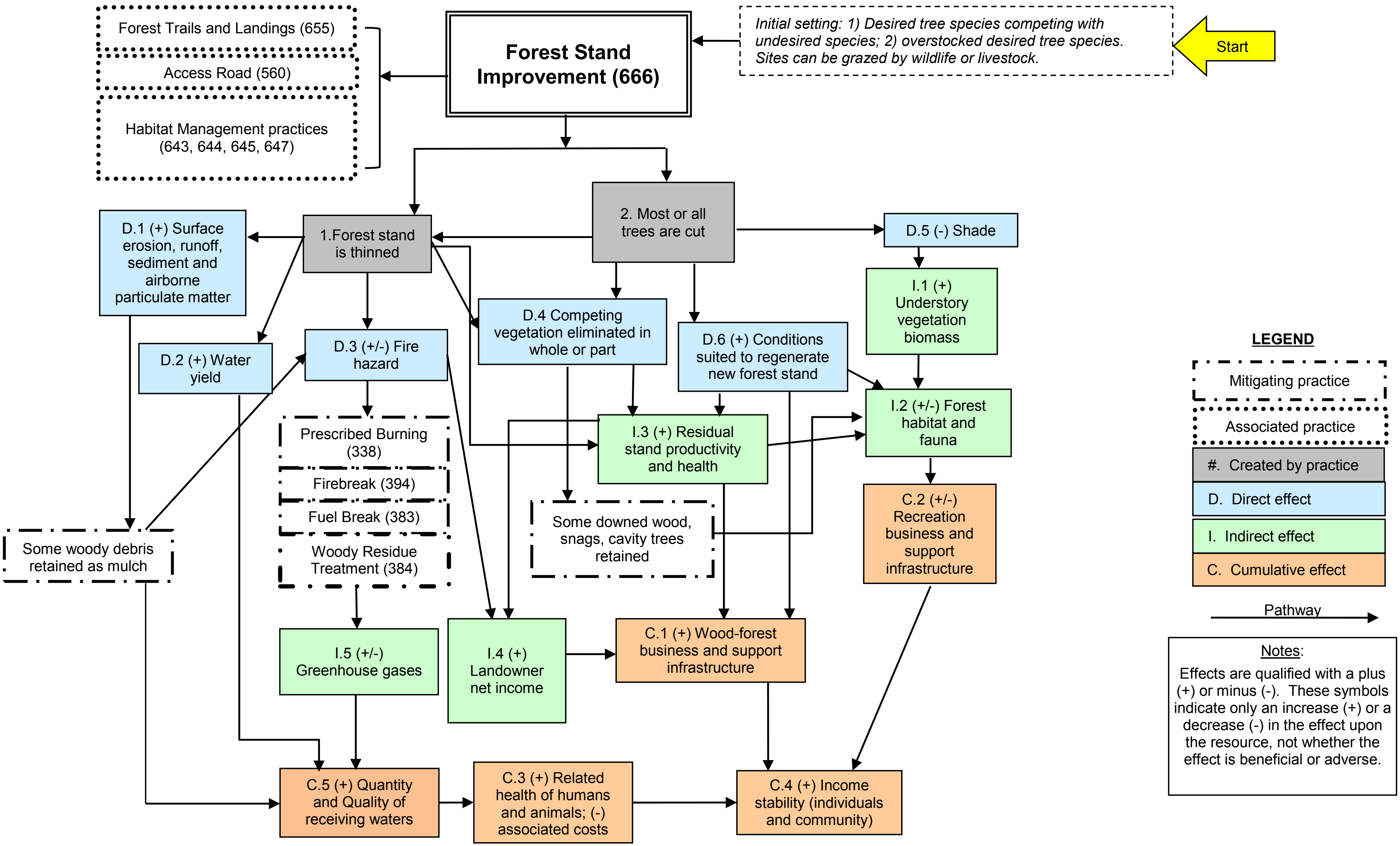
Appendix B. Conservation Practices List for Nutrient Reduction Alternative A and B

Code	Practice	Alternative A	Alternative B
201	Edge of Field Water Quality Monitoring Data Collection	X	X
202	Edge of Field Water Quality Monitoring System Implementation	X	X
313	Waste Storage Facility	X	
314	Brush Management (Heavy Equipment)	X	X
315	Herbaceous Weed Control	X	X
317	Composting Facility	X	
327	Conservation Cover	X	
328	Conservation Crop Rotation	X	
329	Residue Management, No-Till	X	
338	Prescribed Burning	X	X
340	Cover Crops	X	
342	Critical Area Planting	X	X
345	Residue and Tillage Management, Reduced Till	X	
350	Sediment Basin	X	
356	Dike	X	
362	Diversion	X	
378	Pond	X	
381	Silvopasture Establishment	X	
382	Fence	X	X
386	Field Border	X	X
390	Riparian Herbaceous Cover	X	X
391	Riparian Forest Buffer	X	X
393	Filter Strip	X	
394	Firebreak (New construction)	X	X
410	Grade Stabilization Structure	X	X
412	Grassed Waterways	X	
422	Hedgerow Planting	X	
430	Irrigation Pipeline	X	X
441	Irrigation System, Microirrigation	X	
442	Irrigation System, Sprinkler	X	
443	Irrigation System, Surface and Subsurface	X	
449	Irrigation Water Management	X	
460	Land Clearing	X	
464	Irrigation Land Leveling	X	
468	Lined Waterway Or Outlet	X	
484	Mulching	X	X
490	Tree/Shrub Site Preparation (Chemical or Burning)	X	X
490	Tree/Shrub Site Preparation (Mechanical)	X	X
511	Forage Harvest Management	X	
512	Pasture and Hay Planting	X	
516	Pipeline	X	
528A	Prescribed Grazing	X	X
554	Drainage Water Management	X	
561	Heavy Use Area Protection	X	
576	Livestock Shelter Structure	X	
578	Stream Crossing	X	X
580	Streambank and Shoreline Protection	X	X
587	Structure For Water Control	X	X
590	Nutrient Management	X	
595	Pest Management	X	
600	Terrace	X	
612	Tree/Shrub Establishment (Hand Planting)	X	X
612	Tree/Shrub Establishment (Mechanical Planting)	X	X
614	Watering Facility	X	X
642	Water Well	X	
644	Wetland Wildlife Habitat Management	X	
666	Forest Stand Improvement (Chemical/Hand Tools)	X	X
666	Forest Stand Improvement (Cutting/removal with heavy equipment)	X	X

Appendix C. Exemplar Conservation Practice Network Effect Diagrams for Nutrient Reduction

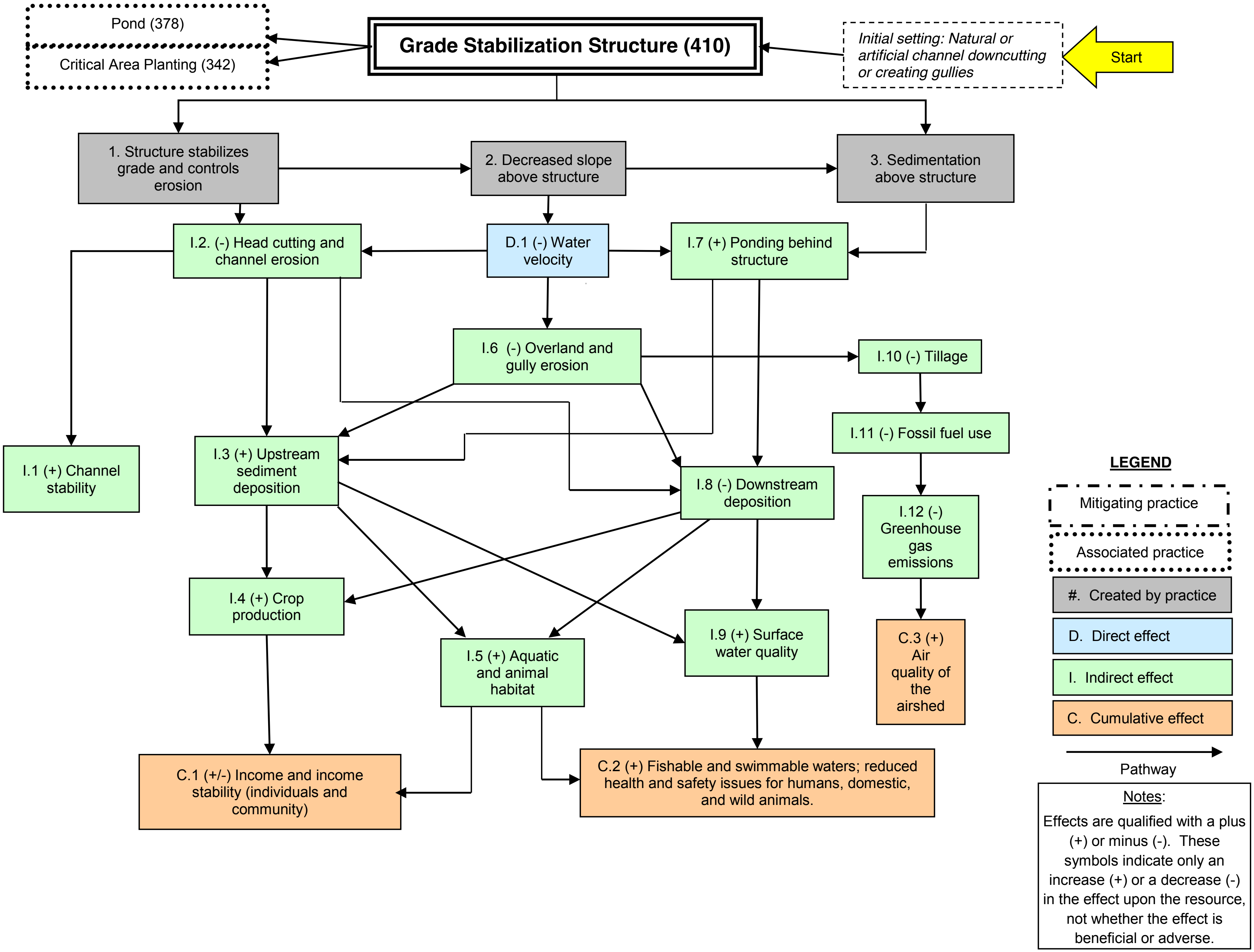
NRCS CONSERVATION PRACTICE EFFECTS - NETWORK DIAGRAM

September 2015



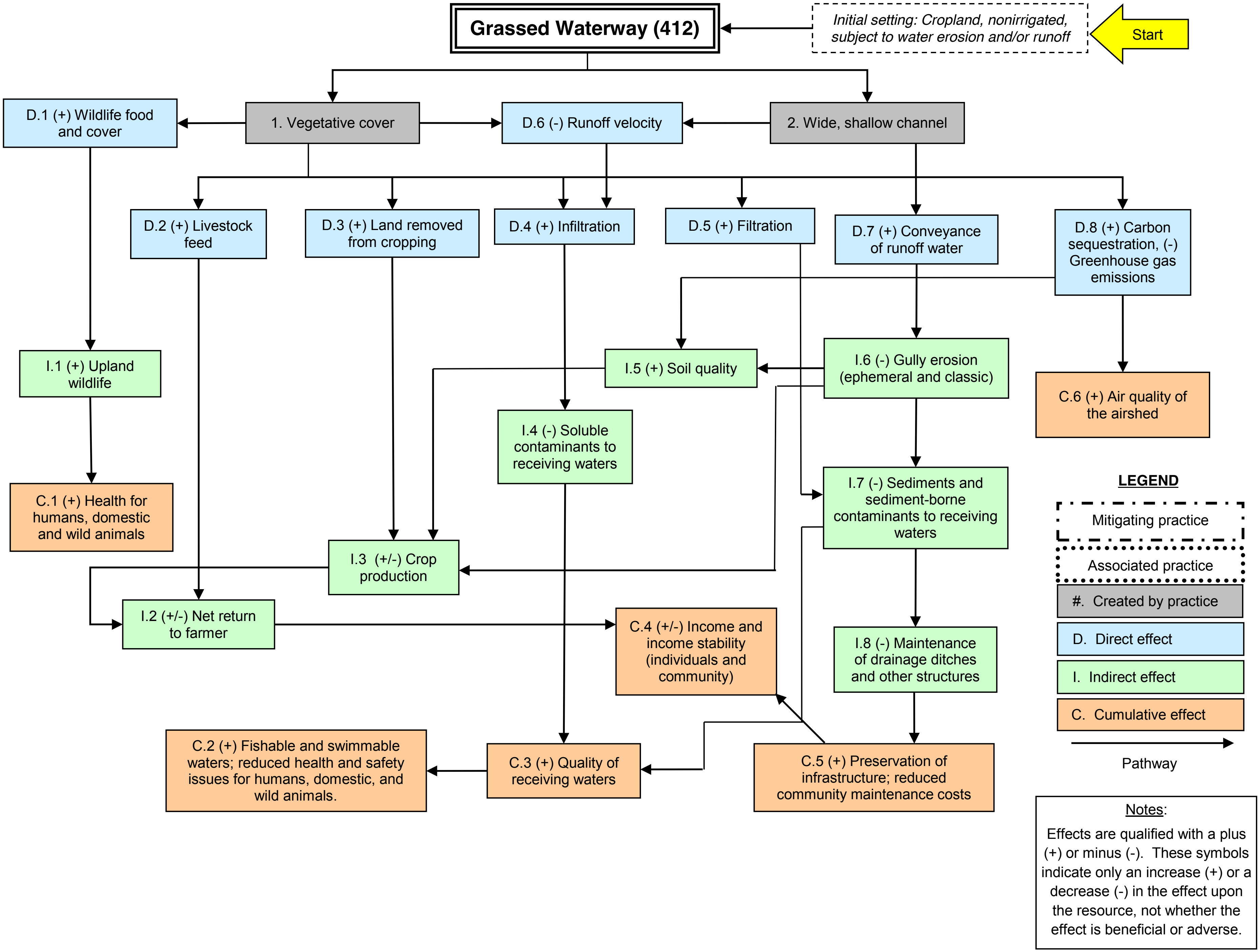
NRCS CONSERVATION PRACTICE EFFECTS - NETWORK DIAGRAM

September 2014



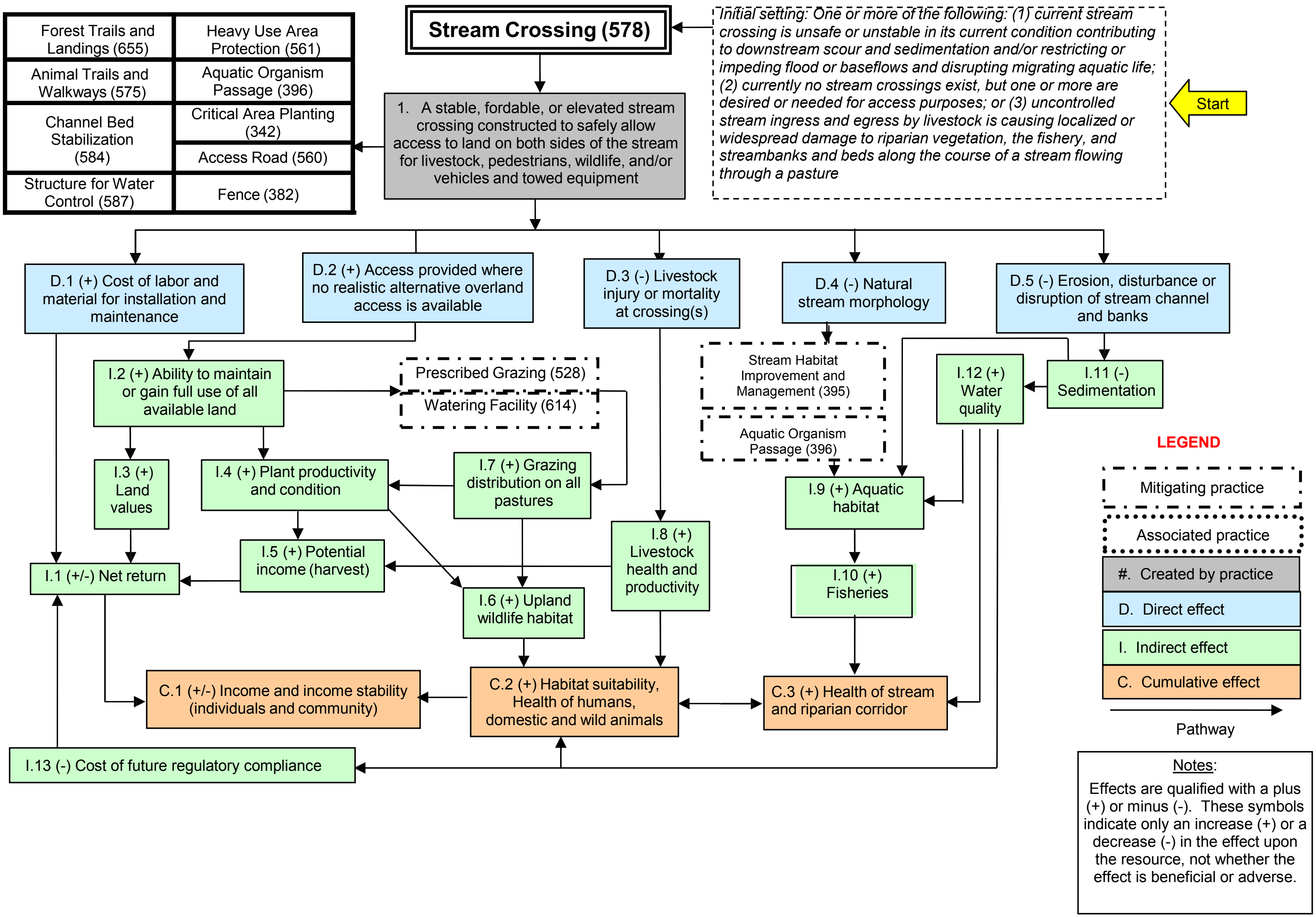
NRCS CONSERVATION PRACTICE EFFECTS - NETWORK DIAGRAM

September 2014



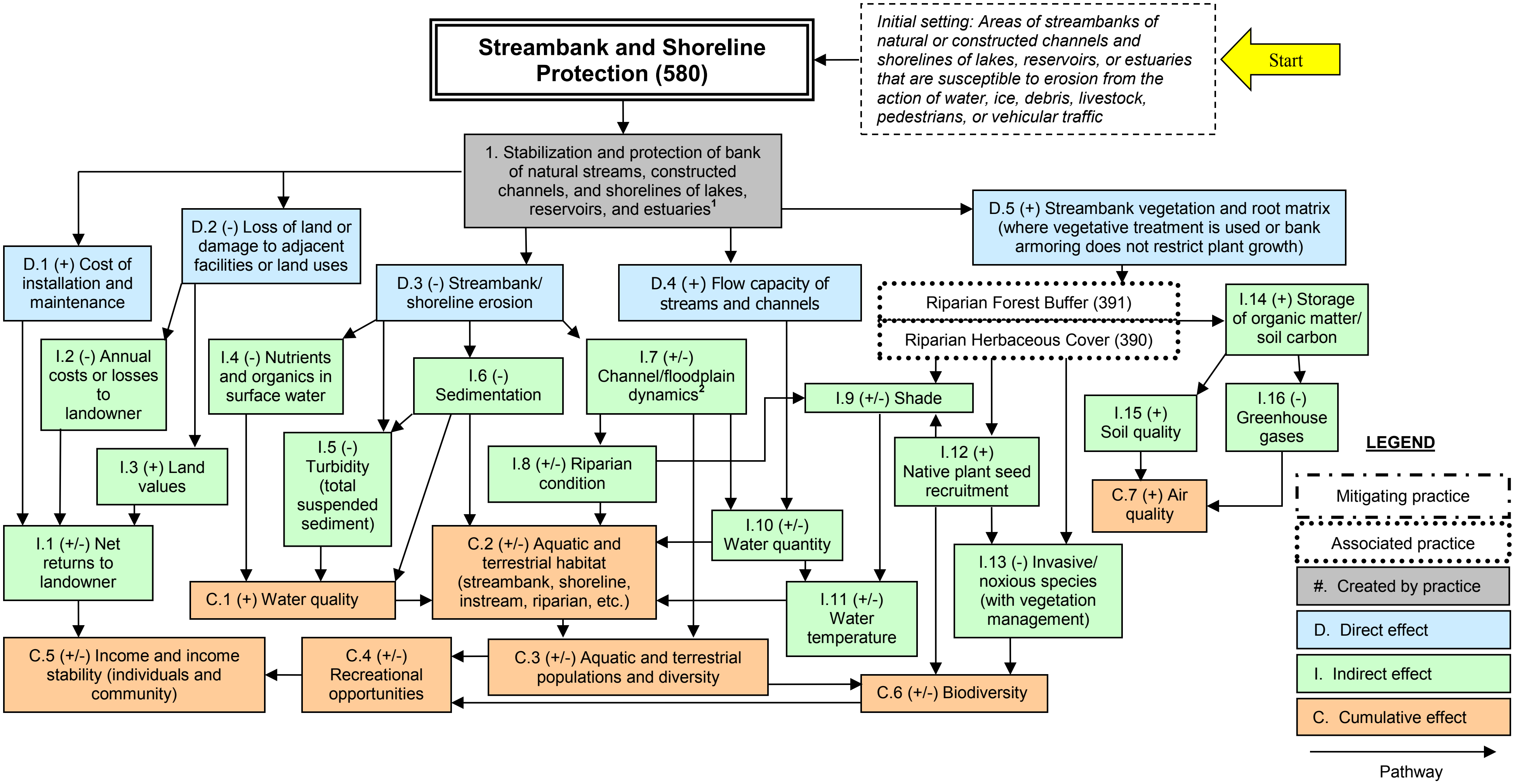
NRCS CONSERVATION PRACTICE EFFECTS - NETWORK DIAGRAM

March 2014



NRCS CONSERVATION PRACTICE EFFECTS - NETWORK DIAGRAM

March 2014



Notes:

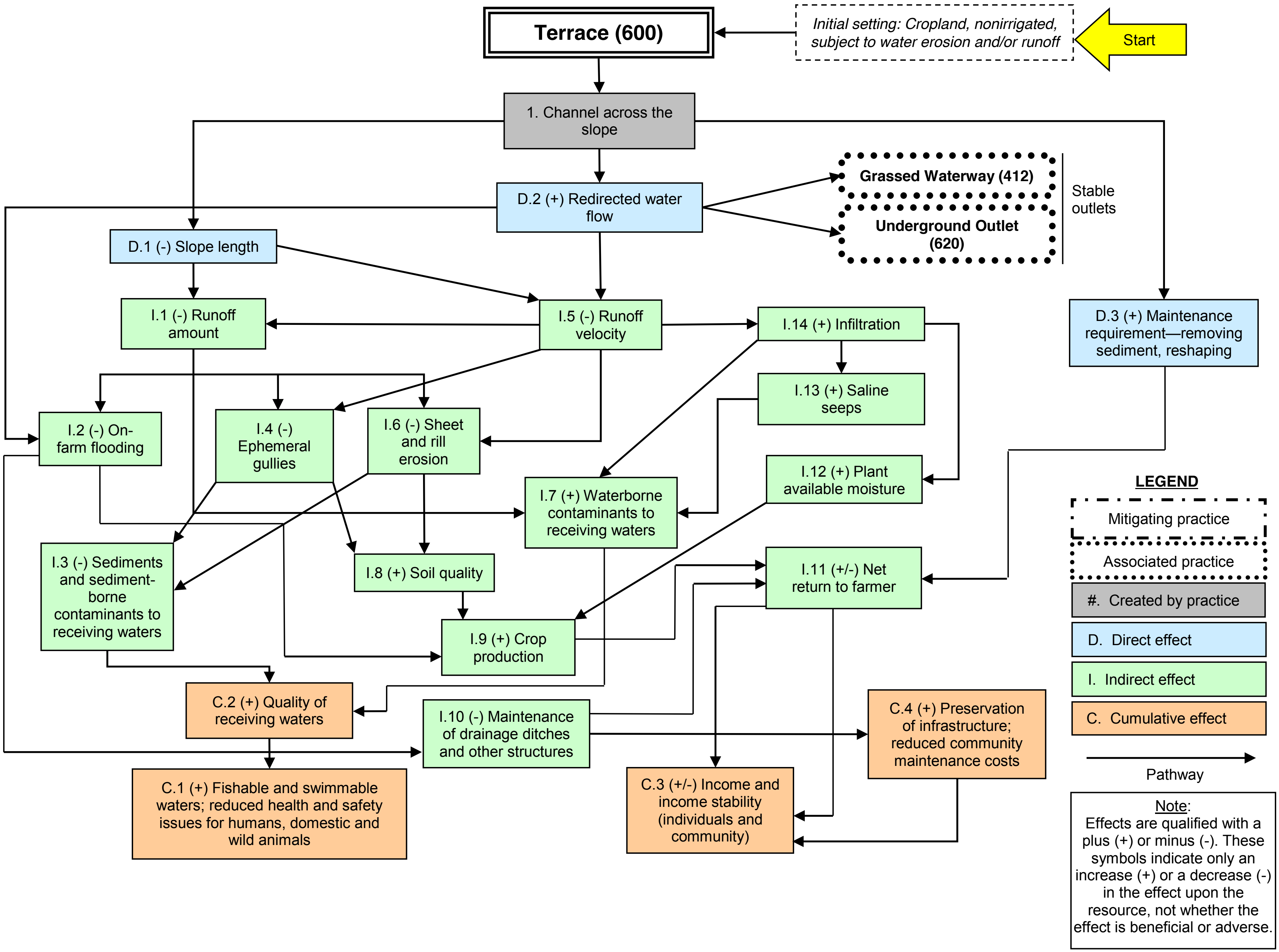
Effects are qualified with a plus (+) or minus (-). These symbols indicate only an increase (+) or a decrease (-) in the effect upon the resource, not whether the effect is beneficial or adverse. **Projects involving long lengths of bank or shoreline, structural controls, substantial earth moving and/or fill, or sensitive waters may need to be evaluated in a site-specific EA or EIS.**

[1] Additional information about potential protection measures and their impacts is available in the EIS for the Emergency Watershed Protection (EWP) Program.

[2] Conventional bank armoring (e.g., rip rap, gabions) may result in decreased (-) channel/flood plain dynamics, and associated impacts, while other less intrusive methods (e.g., stream barbs, stone toes with sloped, vegetated banks) may result in increased (+) channel/flood plain dynamics.

NRCS CONSERVATION PRACTICE EFFECTS - NETWORK DIAGRAM

September 2014



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APPENDIX D

Monitoring and Adaptive Management Plan for Deepwater Horizon NRDA Project:

Graveline Bay Land Acquisition & Management

Table of Contents

1.0 Introduction

Monitoring, Adaptive Management, and Administrative (MAM) Oversight was identified as one of the programmatic goals in the *Deepwater Horizon* (*DWH*) Oil Spill Programmatic Damage Assessment and Restoration Plan and Programmatic Environmental Impact Statement (PDARP/PEIS). The *DWH* NRDA MAM Framework provides a flexible, science-based approach to effectively and efficiently implement restoration over several decades that provides long-term benefits to the resources and services injured by the *DWH* spill. This project MAM plan identifies the monitoring needed to evaluate progress toward meeting project objectives and to support any necessary adaptive management of the restoration project. It identifies potential sources of uncertainty, incorporates monitoring data and decision points that address these uncertainties, and establishes a decision-making process for making adjustments where needed.

This MAM Plan is a living document and will be updated as needed to reflect changing conditions and/or new information. For example, the plan may need to be revised if the project design changes, if initial data analysis indicates that the sampling design is inadequate, or if any uncertainties are resolved or new uncertainties are identified during project implementation and monitoring. Any significant future revisions to this document will be made publicly available through the Restoration Portal.

1.1 Project Overview

The Graveline Bay Land Acquisition and Management project includes acquiring parcels near publicly owned lands in the Graveline Bay Coastal Preserve (CP) in Jackson County, Mississippi. Habitat management measures are also planned including chemical treatment, mechanical treatment, prescribed fire, access restriction, debris removal and road repair/removal and culvert replacement. The project will be implemented at proposed locations in Graveline Bay (Figure 1.1-1). The project planning process has been a collaboration between the Mississippi Trustee Implementation Group (MS TIG) and the Mississippi Department of Marine Resources (MDMR). Potential acquisitions in the project area include up to approximately 1,410 acres of habitat targeted for acquisition from willing sellers. Estuarine marsh, shoreline (beach) and other coastal riparian habitats are in the proposed alternative area, some of which are expected to provide foraging, loafing and nesting for bird species injured by the *DWH* Oil Spill.

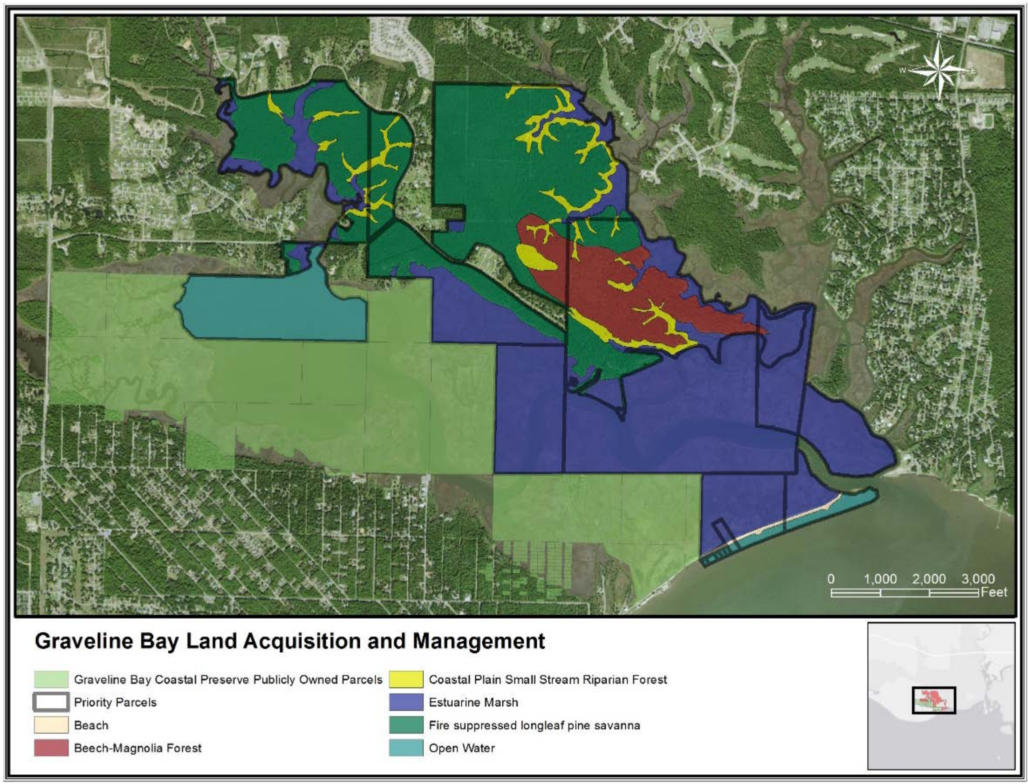

Figure 1.1-1: Graveline Bay Land Acquisition and Management–Parcels and Habitats.

This project is being implemented to partially restore injuries to natural resources and their services injured by *DWH* Oil Spill. As outlined within the PDARP/PEIS, this restoration project falls under the following programmatic goal, restoration type, restoration approach, restoration technique, TIG, and restoration plan:

- Programmatic goals: Restore and Conserve Habitat; Replenish and Protect Living Coastal and Marine Resources
- Restoration types: Wetlands, Coastal and Nearshore Habitats; Birds
- Restoration approaches: Protect and Conserve Marine, Coastal, Estuarine, and Riparian Habitats; Restore and Conserve Bird Nesting and Foraging Habitat
- Restoration techniques: Acquire lands for conservation; Develop and implement management actions in conservation areas and/or restoration projects; Enhance habitat through vegetation management
- TIG: Mississippi
- Restoration plan: Mississippi Trustee Implementation Group 2016-2017 Restoration Plan/Environmental Assessment (MS TIG 2016-2017RP/EA)

This restoration project is being implemented in the Graveline Bay estuary (HUC 10, 0317000907) and more specifically the private parcels adjacent to Graveline Bay and bayou in Jackson County, Mississippi. These targeted parcels are located in Sections 4, 5, 9, 10, 15, and 16 of Township 8 South, Range 7 West.

Management activities will be parcel-specific and may include one or a combination of the following: access restriction, chemical treatment, mechanical treatment, prescribed fire, debris removal and road repair/removal and culvert replacement. The lead Implementing Trustee for the project would be MDEQ working with DOI as an Implementing Trustee.[1] DOI will also be the lead federal agency for conducting the environmental evaluation review for implementation. Trustee roles and responsibilities will be defined in accordance with the SOPs. The Mississippi Department of Marine Resources (MDMR) would be a project partner.

1.2 Project Goals and Restoration Objectives

Under the Restore and Conserve Habitat Programmatic Goal, the MS TIG will focus on the Wetlands, Coastal and Nearshore Habitats Restoration Type. Specific goals of the restoration type include:

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

The specific restoration objectives for this project under the Wetlands, Coastal and Nearshore Restoration Type are:

1) Protect estuarine marsh, shoreline (beach) and other coastal riparian habitats from development and increase habitat connectivity to other large conservation parcels, by acquiring priority lands in the Graveline Bay Coastal Preserve for conservation.
2) Increase and maintain native vegetation species composition in restored habitats within Graveline Bay Coastal Preserve.

---

[1] See PDARP Section 7.2.3; and Trustee Council Standard Operating Procedures for Implementation of the Natural Resource Restoration for the *Deepwater Horizon* (DWH) Oil Spill (SOP) Section 9.5.1.1.

Under the Replenish and Protect Living Coastal and Marine Resources Programmatic Goal, the MS TIG will focus on Birds Restoration Type. Specific goals of the restoration type include:

1) Restore or protect habitats on which injured birds rely.
2) Restore injured birds by species where actions will provide the greatest benefits within geographic ranges that include the Gulf of Mexico.

The specific objectives for this project relative to the Birds Restoration Type are:

1) Increase and maintain shorebird (species injured by the *DWH* Oil Spill) use of beach habitat.
2) Increase and maintain wading bird habitat (species injured by the *DWH* Oil Spill) use in acquired habitats.

The following Restoration Objectives, as outlined in this MAM Plan, are:

1) Protect estuarine marsh, shoreline (beach) and other coastal riparian habitats from development and increase habitat connectivity to other large conservation parcels, by acquiring priority lands in the Graveline Bay Coastal Preserve for conservation.
2) Increase and maintain native vegetation species composition in restored habitats within Graveline Bay Coastal Preserve.
3) Increase and maintain shorebird (species injured by the *DWH* Oil Spill) use of beach habitat.
4) Increase and maintain wading bird habitat (species injured by the *DWH* Oil Spill) use in acquired habitats.

Performance criteria will be used to determine restoration success or the need for corrective action in accordance with (15 CFR 990.55(b)(1)(vii)) and are outlined for each objective in Section 2.

1.3 Project Activities and Anticipated Outcomes

The singular purpose of conservation is to ensure the protection of habitat from development or further degradation. Conserving land prevents development and disturbances in priority habitats that buffer protected coastal wetlands, but then allows for the restoration and enhancement of native vegetation assemblages and structure that support life cycle needs of numerous injured shorebirds and wading birds in coastal Mississippi (Table 1.3-1). The habitats in the project area include estuarine marsh, fire-suppressed pine savannas, beach-magnolia forests, coastal plain small stream riparian forest, beach and open water. Protection of these habitats within this key Gulf Coast watershed will protect downstream natural resources by slowing and filtering nutrient laden runoff, maintain resiliency of dynamic habitats by allowing for free movement in response to changing climate conditions, and provide diverse habitat to serve as refuge for wildlife in the densely populated coastal region. Habitat conservation also enhances habitat connectivity and ties into ecological paradigms of hub and corridors for species movement, habitat migration, and population source sink models. Habitat enhancement of conserved lands through various restoration measures of invasive species removal, restoring hydrological functions, returning fire to the systems increases the natural ecosystem functioning of the respective habitats, resulting in a more resilient and sustainable habitat, increased heterogeneity of habitat patches, and thus increases the diversity of the system.

Table 1.3-1: Conceptual Setting and Anticipated Outcomes for the project.

Activity	Output	Short-term outcome	Long-term outcome
• Implement acquisition actions to inhibit development and increase habitat connectivity	• Protection and conservation of priority habitats and birds in the Graveline Coastal Preserve boundary	• Increase in habitat connectivity and core areas • Increase in injured bird habitat use	• Protection of key habitats in perpetuity • Enhancement of ecosystem services of Gulf coast habitats and living resources
• Implement management actions on acquired parcels	• Increase natural ecosystem functioning • Enhanced habitat for shorebird use	• Increase in native vegetation species composition and desired vegetation structure • Increase in injured bird habitat use	• Increase in management of connected habitats • Enhancement of ecosystem services of Gulf coast habitats and living resources

1.4 Sources of Potential Uncertainty

Sources of potential uncertainty, the degree of uncertainty, and the level of uncertainty among projects will vary. Monitoring to resolve potential uncertainties affecting these decisions can allow for more effective expenditure of resources (e.g., optimized project selection) into the future as learning takes place. Further, the learning that takes place through monitoring allows corrective actions to be taken to improve project outcomes. If unresolved, the potential uncertainty may delay the time it takes to achieve the restoration objectives, hinder an implemented project’s ability to fully achieve restoration objectives, or in the worst-case scenario, it may have the potential to cause a project to fail altogether, regardless of the corrective actions taken. In this case, the MS TIG is proposing a project that is feasible and has a high likelihood of success. However, potential uncertainties for the project were nonetheless identified and evaluated. These are shown in Table 1.4-1.

Table 1.4-1: Potential uncertainties that may affect success of the Graveline Land Acquisition and Management Project.

Uncertainty	
Native vegetation communities do not regenerate after implementation of restoration/management activities.	Conduct targeted monitoring on metrics related to native plant composition and abundance specific to each habitat type (i.e., fire-suppressed pine flatwoods, etc.) and for each restoration/management action (chemical treatment,

Uncertainty	**Summary of Strategy to Resolve**
	prescribed fire, mechanical treatment). Monitoring data will be used to refine future management actions.
Bird species injured by the *DWH* Oil Spill fail to use designated bird habitat affected by the project.	Conduct targeted monitoring on habitat metrics specific to wading bird habitat requirements. Monitoring data will be used to refine future management actions.
Targeted habitats do not become available for purchase.	Funding allocated for fee-simple acquisition will be used to implement habitat restoration activities within project boundaries.

2.0 Project Monitoring

The proposed monitoring for this restoration project was developed to evaluate project performance. The monitoring parameters, outlined below, are organized by project objective, with one or more monitoring parameters for each objective. Information is provided on the monitoring methods, timing and frequency, duration, sample size, and sites. In addition, example performance criteria for each parameter are identified (if applicable), including example corrective actions that could be taken if the performance criteria are not met. These parameters will be monitored at the restoration project. The parameters listed below may or may not be tied to performance criteria and/or corrective actions. Project monitoring will be applied to the following objectives:

Objective 1: Acquire targeted land parcels to protect and increase connectivity in coastal habitats.

Objective 2: Implement management activities to help restore and manage the structure and function of native vegetation in coastal habitats.

Parameter # 1: Acreage of acquired land, by habitat type - the number of acres acquired through purchase of parcels in the project area.

a) Rationale: Evaluate progress toward meeting Objective 1.
b) Method: This parameter will record the number and location of acres acquired through purchase of targeted parcels within the project boundaries.
c) Timing, Frequency, and Duration: Land acquisitions will be recorded after each purchase and reported at the end of the project or at MS TIG request. Acquisition will occur over a 10-year period as parcels become available.
d) Sample Size: N/A
e) Sites: Parcels within and adjacent to the Graveline Coastal Preserve boundary.
f) Performance Criteria: Fee-simple acquisition of up to 1,410 acres of target habitats within the project boundaries.

g) Corrective Action: Purchase of lands from willing sellers will be subject to negotiations with the State of Mississippi as well as due diligence activities. If for any reason, the State is unable to purchase the parcel, the next parcel that becomes available within the project area will be sought.

Parameter #2: Vegetation Structure

a) Rationale: Evaluate progress toward meeting Objective 2.
b) Methods:
   1. The project will adopt the methodologies described in the *Field Manual for Rapid Assessment Metrics for Wildlife and Biodiversity in Southern Open Pine Ecosystems* (see Nordman et al. 2016) for the habitat "Wet Longleaf & Slash Pine Flatwoods & Savannas". Assessment will consist of walking stands along established transects or visits to sets of random points within stands and documenting site characteristics (see Appendix 1). Then, metric assessment scores will be derived to calculate a score for the canopy, ground layer, and invasive species, and an overall score applied using the worksheet provided in Appendix 2.
c) Timing, Frequency, and Duration: Habitat management will occur only after lands are acquired and a management plan is written. Monitoring activities can begin once a parcel is acquired. Monitoring will take place twice per year (growing season and non-growing season) for the first year after treatment and once per year for the next four years in the growing season. Inter-annual sampling times may differ based on the timing of restoration actions. After the five-year period, the data will be analyzed and the appropriate corrective actions will be implemented to address the performance criteria.
d) Sample Size: Vegetation structure sampling design will be determined at a later date when a more detailed assessment of the habitat unit can take place.
e) Sites: All acres acquired
f) Performance Criteria:
   1. Vegetation structure for fire-suppressed pine savanna (by year 5)
      i. 20-65% canopy cover of longleaf or slash pine
      ii. 40 to 100% herbaceous cover
      iii. Invasive nonnative plant species in any stratum present but sporadic (1-5 % cover)
g) Corrective Action: Based on the adaptive management plan, adjust management techniques as necessary to reach performance criteria goals. This may include increasing or decreasing the prescribed fire frequency, increasing amount of mechanical removal of canopy species, or an increase in herbicidal treatment for invasive species.

Parameter #3: Vegetation Composition

a) Rationale: Evaluate progress toward meeting Objective 2.

b) Methods: The project will adopt protocols outlined in *Long-Term Vegetational Monitoring at the Mississippi Sandhill Crane National Wildlife Refuge, 1997 by A.F. Clewell, R.S. Beaman, and M.E. Lasley, 47 pp*. For species composition, using a point intercept method, all vascular plants rooted within the station will be identified. For community structure, all plants touching a sampling pole to life form (graminoid, forb, woody) will be documented and the tallest plant at each sampling point measured. Vegetation cover will be derived by dividing the number of sampling points at which each life form was intercepted by the total. Species abundance will be measured in terms of species frequency as the number of sampling points along a transect at which each species was recorded.

c) Timing, Frequency, and Duration: Habitat management will occur only after lands are acquired and a management plan is written. Monitoring activities can begin once a parcel is acquired. Monitoring will take place twice per year (growing season and non-growing season) for the first year after treatment and once per year for the next four years in the growing season. Inter-annual sampling times may differ based on the timing of restoration actions. After the five-year period, the data will be analyzed and the appropriate corrective actions will be implemented to address the performance criteria.

d) Sample Size: Vegetation composition sampling design will be determined at a later date when a more detailed assessment of the habitat unit can take place.

e) Sites: All acres acquired

f) Performance Criteria: 95% native flora[2]

g) Corrective Action: Based on the adaptive management plan, adjust management techniques as necessary to reach performance criteria goals. This may include increasing or decreasing the prescribed fire frequency, increasing amount of mechanical removal of canopy species, or an increase in herbicidal treatment for invasive species.

Parameter #4: Invasive Species

a) Rationale: Evaluate progress toward meeting Objective 2.

b) Methods: The project will adopt protocols establish by MDMR Coastal Preserve System for invasive species assessment. Each site will undergo an initial GIS analysis that will analyze recent historical imagery (best available) and habitat areas. Historical land use in that period will be analyzed for high-risk land use changes which could introduce invasive plant species or increase their competiveness with typical native species. Example land uses will include logging, presence of roadways and other artificial edges, presence of hunting food plots and stands, and areas impacted by storm surge or wind events. This analysis will result in prioritized polygons within the subject property that will be considered as 'high risk' for the

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[2] The performance criteria documented here represents a desired condition for the vegetation for a restored site that is well-managed through time. These conditions will be variable across the project area given uncertainties in the timing of management implementation, weather, and other factors.

presence of invasive species. An initial site reconnaissance will be conducted where property is viewable by roads, trails, or waterways. Occurrences of invasive plant species will be noted and compared to the coverage of ‘high risk’ polygons. This comparison may result either in polygons being dropped or added to the original ‘high risk’ list. Invasive species will be comprehensively documented and the extent mapped while engaged in the vegetation structure survey.

c) Timing, Frequency, and Duration: Habitat management will occur only after lands acquired and a management plan is written. Monitoring activities can begin once a parcel is acquired. Monitoring will take place twice per year (growing season and non-growing season) for the first year after treatment and once per year for the next four years in the growing season. Inter-annual sampling times may differ based on the timing of restoration actions. After the five-year period, the data will be analyzed and the appropriate corrective actions will be implemented to address the performance criteria.
d) Sample Size: Areal extent of invasive species in acquired habitat.
e) Sites: All acres acquired.
f) Performance Criteria: 1-5% cover in invasive species.[3]
g) Corrective Action: Based on the adaptive management plan, adjust management techniques as necessary to reach performance criteria goals. This may include increasing or decreasing the prescribed fire frequency, increasing amount of mechanical removal of canopy species, or an increase in herbicidal treatment for invasive species.

Parameter # 5: Shorebird Diversity and Abundance

a) Rationale: This parameter will be used to evaluate progress toward Objective 3. The MS TIG coordinated with Audubon to determine the number and kind of surveys to compare with similar data collected since 2010. The addition of summer season transects were recommended to capture data on potential solitary nesting shorebirds.
b) Method: Survey routes will consist of established transects along stretches of shoreline/beach. A total of 20 surveys will be conducted annually, in four survey pulses. Species type and abundance will be documented.
c) Timing, Frequency, and Duration: Four survey pulses will be conducted each year over a five-year period corresponding to fall migration, winter (overwinter), spring migration, and summer nesting as follows:
   1. Fall surveys occur between 20 August and 30 October.
   2. Winter surveys occur between 10 January and 20 February.
   3. Spring surveys occur between 20 March and 30 May.
   4. Summer surveys occur between 1 June and 31 July.
d) Sample Size: One survey transect over 5 acres of beach front

[3] The performance criteria documented here represents a desired condition for the vegetation for a restored site that is well-managed through time. These conditions will be variable across the project area given uncertainties in the timing of management implementation, weather, and other factors.

e) Sites: Graveline Beach (5 acres) before and after management action
f) Performance Criteria:
   1. Increase shorebird habitat use by year 5
g) Corrective Actions:
   1. Identify actions to benefit priority species (e.g., vegetation management, stewardship actions)
   2. Continue to monitor

Parameter # 6: Wading Bird Diversity and Abundance

a) Rationale: This parameter will be used to evaluate progress toward Objective 4.
b) Method: Survey routes will consist of established transects along stretches of forested riparian habitat. A total of 10 surveys will be conducted annually, in two survey pulses. Species type and abundance will be documented as well as visible nests during the nesting season.
c) Timing, Frequency, and Duration: Two survey pulses will be conducted each year over a five-year period corresponding to spring and summer nesting. Five surveys will occur in each season.
d) Sample Size: Survey routes will be established in ten riparian drainage locations across the project site. Each riparian area will have one transect route. Routes will differ in length from 200-500 meters
e) Sites: Survey routes will be conducted as parcels are acquired. All routes will be located in parcels north of Graveline Bay/Bayou
f) Performance Criteria:
   1. Increase wading bird habitat use by year 5
g) Corrective Action:
   1. Continue to monitor
   2. Identify actions to benefit priority species (e.g., vegetation management, stewardship actions)

3.0 Rationale for Adaptive Management

As discussed in the PDARP/PEIS, adaptive management is a form of structured decision-making applied to the management of natural resources in the face of uncertainty (Pastorok et al. 1997; Williams 2011). It is an iterative process that integrates monitoring and evaluation of management actions with flexible decision-making, where adjustments are made to management approaches based on observed outcomes (NRC 2004). Within the context of ecological restoration, adaptive management addresses key uncertainties by linking science to restoration decision-making (Steyer & Llewellyn 2000).

Although adaptive management is a critical component of the restoration plan as a whole, the need for adaptive management may vary on a project by project basis. For example, higher uncertainty may be associated with novel approaches, larger restoration scales (e.g., number and area of projects), limited scientific understanding of target resources, increasing influence of socioeconomic factors, and longer time scales of restoration implementation (LoSchiavo et al. 2013; Simenstad et al. 2006; Steyer & Llewellyn 2000; Williams & Brown 2012; see PDARP/PEIS for more information). The OPA NRDA regulations require that all restoration projects clearly identify performance criteria that will be used to determine project success or the need for corrective action. Projects with more uncertainty may require a more active approach to adaptive management.

4.0 Evaluation

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

The results of the analysis will be used to answer the following questions:

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

The analysis methods will be applied to all monitoring parameters as follows:

Vegetation structure

Recorded metrics will be compared an annual basis using descriptive summaries to track performance across time by analyzing individual metric scores and final scores for each sampling effort. Comparisons will include canopy cover, ground layer cover, basal area, and invasive species cover (Appendix 2).

Vegetation Composition

All data will be analyzed using software capable of calculating general descriptive statistical analyses. Common analyses include:

- Descriptive summaries of cover for grass, forbs, and shrubs. Cover is calculated by dividing the number of intervals at which a life form was measured by the total number of intervals measured.
- Descriptive summaries of mean grass height, mean forb height, mean shrub height, pre- and post-treatment. The mean height of a life form is calculated by dividing the sum of the heights by the total number of interception points at which the life form occurred.
- Multivariate statistics (PCA/per MANOVA) can be applied to detect the degree of similarity of species abundance across space and time (Clewell 1997).

Bird Habitat Use

All data will be analyzed using software capable of calculating general descriptive statistical analyses. Common analyses include:

- Descriptive summaries and tabulation of species richness and species abundance across seasons and years.
- Comparative statistics to determine differences in species richness and abundance before and after management action as well as comparisons with legacy data for the site.

5.0 Project-Level Decisions

The decision-making process requires a structured approach for incorporating new information gained from monitoring and evaluation. As specified in the NRDA regulations, performance criteria will be used to determine restoration success or the need for corrective action (15 CFR 990.55(b)(1)(vii)). However, unanticipated consequences, previously unknown conditions or unanticipated environmental drivers uncovered during the evaluation step may also determine the need for corrective actions. Table 5.0-1 provides the interim performance criteria for helping determine whether adjustments to the project are needed to better ensure the project meets the final performance criteria used to determine project success, as well as the potential adaptive management actions (e.g., mid-course corrections or corrective actions) that may be considered for individual parameters. This table does not include all possible options; rather, it includes a list of potential adaptive management actions for each individual parameter to be considered. The decision to implement a corrective action should holistically consider the overall outcomes of the restoration project by assessing the results of all monitoring parameters compiled in the evaluation step.

Table 5.0-1: Corrective Actions for the Graveline Bay Land Acquisition and Management.

Monitoring Parameter	**Final Performance Criteria used to determine Project Success (Year 10)**	**Interim Performance Criteria**	**Potential corrective actions or mid-course corrections**
Acres Acquired	Fee-simple acquisition of 1,410 acres of priority habitats in the project area.	N/A	**1)** Funding allocated for fee-simple acquisition will continue beyond year 5.
Acres Managed for Vegetation Structure	**1)** 20-65% canopy cover of longleaf or slash pine. **2)** 40 to 100% herbaceous cover **3)** Invasive nonnative plant species in any stratum present but sporadic (1-5 % cover).	Performance criteria not met by year 5	**1)** Change burn frequency **2)** Modify mechanical removal strategy **3)** Alter herbicide treatments **4)** Continue to monitor.

Monitoring Parameter	Final Performance Criteria used to determine Project Success (Year 10)	Interim Performance Criteria	Potential corrective actions or mid-course corrections
Shorebird Diversity and Abundance	**1)** Increase in species diversity **2)** Increase in species abundance	Performance criteria not met for year 5	**1)** Identify actions to benefit priority species (e.g., vegetation management, stewardship actions) **2)** Continue to monitor
Wading Bird Diversity and Abundance	**1)** Increase in species diversity **2)** Increase in species abundance	Performance criteria not met for year 5	**1)** Identify actions to benefit priority species (e.g., vegetation management, stewardship actions) **2)** Continue to monitor

6.0 Monitoring Schedule

The schedule for the project monitoring is shown in Table 6.0-1, separated by monitoring activity. Execution monitoring occurs when project has been fully executed as planned (Year 0). The monitoring of project parameters is dependent on the voluntary participation by landowners to sell targeted parcels. Performance monitoring will occur in the years following initial project execution (Years 1-5) as depicted in Table 6.0-1. The length of time a parameter is monitored is contingent on when the restoration action is executed within project timeline. Thus, parameters may receive monitoring for 1-5 years. For example, if a parcel is acquired in year 7 of the project, monitoring will occur for three years to coincide with the overall project timeline. Monitoring after the 10-year project timeline will depend on available budget, the timeframe for implementation of restoration measures (Post-execution Year 1, Year 4, Year 5) and Implementing Trustee discretion as to whether monitoring should be extended. The monitoring schedule will be updated as acquisitions are finalized and management actions implemented.

Table 6.0-1: Monitoring Schedule.

Monitoring Parameters	**Monitoring Timeframe**					
	Execution Monitoring (initial)	**Post-Execution Monitoring (years related to those following treatment)**				
	As-built (Year 0)	**Year 1**	**Year 2**	**Year 3**	**Year 4**	**Year 5**
Parameter 1		x	x	x	x	x
Parameter 2		x	x	x	x	x
Parameter 3		x	x	x	x	x
Parameter 4		x	x	x	x	x
Parameter 5		x	x	x	x	x
Parameter 6		x	x	x	x	x

7.0 Data Management

To the extent practicable, all environmental and biological data generated during monitoring activities will be documented using standardized field datasheets. If standardized datasheets are unavailable or not readily amendable to record project-specific data, then project-specific datasheets will be drafted prior to conducting any project monitoring activities. All tangible forms of field data will be reviewed by Implementing Trustee for completeness and accuracy before being finalized. Original hardcopy datasheets and notebooks and photographs will be retained by the Implementing Trustee.

All field datasheets and notebook entries will be scanned to PDF files and will be archived along with the hardcopy datasheets. 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 will be made and the original preserved.

Relevant Project data that are handwritten on hardcopy datasheets or notebooks will be transcribed (entered) into Excel spreadsheets (or similar digital format). After transcription of the data, a second person not associated with data transcription will perform a verification of the data in the electronic data sheets against the original hardcopy datasheets and/or notebooks, and will make any corrections to transcription errors as appropriate before data are used for any analyses or distributed outside of the agency. MDEQ will verify and validate monitoring data and information and will ensure that all data is entered or converted into agreed upon/commonly used digital format labeled with metadata.

7.1 Data Review and Clearance

Once data is entered electronically it is reviewed and verified for completeness. A quality check is made by verbally comparing the electronic data entered to the original hard copy data sheet. Data are validated and any corrections needed are made. Upon validation, data are approved for analysis, reporting and archiving. All data are kept in one permanent electronic folder as a permanent record.

After any and all identified errors are addressed, data are considered to be QA/QC'd. MDEQ will give the other TIG members time to review the data before making such information publicly available. Before submitting the monitoring data and information package, co-Implementing Trustees shall confirm with one another that the package is approved for submission. No data release can occur if it is contrary to federal or state laws.

7.2 Data Storage and Accessibility

Once all data has been verified by quality assurance/quality control procedures, it will be submitted to the Restoration Project Database that is maintained by MDEQ.

7.3 Data Sharing

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

8.0 Reporting

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

- Summary data –synthesized data for all efforts during the year
- Graphs – vegetation characteristics, acres managed, bird species diversity and abundance, etc.
- Interpretation of graphical data
- Discuss comparison of data if pretreatment and post treatment data are available
- Explanation of results
- Uncertainties with management actions
- Potential data collection issues
- Issues to be resolved
- Issues to improve data collection or cooperation in getting quality data
- Issues associated with data loss or inability to collect data for a time period

9.0 Roles and Responsibilities

The MS TIG is responsible for addressing MAM objectives that pertain to their restoration activities and for communicating information to the Trustee Council or Cross-TIG MAM work group. The lead Implementing Trustee for the project would be MDEQ working with DOI as an Implementing Trustee[4]. DOI will also be the lead federal agency for conducting the environmental evaluation review for implementation. Trustee roles and responsibilities will be defined in accordance with the SOPs. The Mississippi Department of Marine Resources (MDMR) would be a project partner. MDEQ's roles include coordination with MDMR and the MS TIG to track project progress, program management and oversight, leading acquisition of parcels, and partnering with MDMR for management operations.

10.0 Monitoring Budget

The overall budget for project monitoring and adaptive management is anticipated to be approximately 7-12% of the total project budget. This budget range is considered to be in draft form and is subject to change as project planning and implementation progress.

11.0 References

Clewell, A.F., B.S. Reed, M.E. Lasley. 1997. Long-term vegetational monitoring at the Mississippi Sandhill Crane National Wildlife Refuge, 1997. 35pp. Submitted to: Mississippi Sandhill Crane National Wildlife Refuge, Gautier, MS

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National Research Council. 2004. Adaptive Management for Water Resources Project Planning. National Academies Press, Washington, DC. 138pp.

[4] See PDARP Section 7.2.3; and Trustee Council Standard Operating Procedures for Implementation of the Natural Resource Restoration for the *Deepwater Horizon* (DWH) Oil Spill (SOP) Section 9.5.1.1.

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Williams, B. K. 2011. Adaptive management of natural resources—framework and issues. Journal of Environmental Management, 92(5), 1346-1353.

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APPENDIX 1

Field Form for Rapid Assessment Metrics for Wildlife and Biodiversity in Southern Open Pine Ecosystems

Date: **Project:** **Site ID:**

Field Crew Team Members:
Leader: ______________________________
Assistants:____
Photographer: ______________________ **Photos of Site:** __*AA Centrum out:* _N _E_ S _W ; __*Buffer in*: _N _E _S _W; Add'l: Y / N
Photo filenames:
____

Assessment Area Shape: Circle, Rectangle, Square, Polygon **Bearing:** __________
Assessment Area Dimensions: radius 18m, 40m, ______ m/ft. or rectangle ______ m/ft wide x ______m/ft long (fill in values, units)
State:_____**County:**___________________ **Twp:**____**Range:**____**Section:**____**USGS 7.5' Quad:**___________________________
Landowner/Managed Area Name:_____________________________ **Contact Person**: __________________________________
Stand Name: _____________ **Permit Required?** ___ **Locked Gate?** ___ **Access Difficulties? (describe)**__________________________
SITE DESCRIPTION:

GENERAL DRAWING (Optional): Provide a drawing of the assessment area, including its boundaries, either aerial view or transect view.				
LOCATION: Assessment Area CENTRUM (check one) ___ ORIGINAL ___ MOVED (why? how far?)				
GPS Unit:	**GPS Filename:**		**Projection:**	
UTM Zone:	**Datum:** NAD83 WGS84	**GPS Accuracy:** ___ m/ ft	**PDOP:**	**# of Sat's:**
UTM X Easting: — — — — — —	**LAT:** decimal degree	*Original (GRTS):*	Field:	Post-processed:
UTM Y Northing: — — — — — — —	**LONG:** decimal degree			

Classification (use to select appropriate Southern Open Pine Metrics Datasheet for page 2 of field form)

Southern Open Pine Grouping:

____

Other Community Classification Reference: ____________________ **Name:**

____

USNVC Association (Optional): ________________________________

Classification Comments:

Notes:

APPENDIX 2

Wet Longleaf & Slash Pine Flatwoods & Savannas Metrics Data Sheet					Recorded Measured Value of Metric	Recorded Metric Score (1.0-4.0)
Canopy Metrics						
	Excellent = 4.0	**Good = 3.0**	**Fair = 2.0**	**Poor = 1.0**		
Canopy Southern Yellow Pine Basal Area	20-80 ft^2/acre basal area of longleaf or slash pine	10 to <20 or >80 to <90 ft^2/acre basal area of longleaf or slash pine	5 to <10 or 90 to <100 ft^2/acre basal area of longleaf or slash pine	<5 or ≥100 ft^2/acre basal area of longleaf or slash pine	**ft^2/acre BA**	**x0.25**
Southern Yellow Pine Canopy Cover	20-65% canopy cover of longleaf or slash pine	15 to <20% canopy cover or >65-75% canopy cover of longleaf or slash pine	10 to <15% canopy cover or >75-85% canopy cover of longleaf or slash pine	<10% cover or >85% cover of longleaf or slash pine	**% cover**	**x0.25**
Southern Yellow Pine Stand Age Structure	BA ≥20 ft^2/acre of flat-top longleaf or slash pine of any diameter and/or longleaf or slash pine trees ≥14" DBH class	BA ≥10 ft^2/acre of longleaf or slash pine trees ≥14" DBH class	Longleaf or slash pine trees ≥14" DBH class present, but at <10 ft^2/acre BA	No longleaf or slash pine trees ≥14" DBH or with flat-top slash or longleaf pine	**ft^2/acre BA**	**x0.25**
Ground Layer Metrics						
	Excellent = 4.0	**Good = 3.0**	**Fair = 2.0**	**Poor = 1.0**		
Overall Native Herbaceous Ground Cover	40-100% herbaceous cover	30 to <40% herbaceous cover	20 to <30% herbaceous cover	<20% herbaceous cover	**% cover**	**x0.25**
Invasive Plant Presence / Distribution	Invasive nonnative plant species absent or cover is very low (≤1% cover)	Invasive nonnative plant species in any stratum present but sporadic (1-5% cover)	Invasive nonnative plant species in any stratum uncommon (5-10% cover)	Invasive nonnative plant species in any stratum common (>10% cover)	**% cover**	**x0.25**
Final Score is : **Canopy Score _______x0.33 + Midstory Score________x0.33 + Ground Layer Score________x0.33 =** **Evaluation Scale: 4.0 to 3.5 = Excellent, 3.5 to 2.5 = Good, 2.5 to 1.5 = Fair, 1.5 to 1.0 = Poor**					**Ground Layer Score =**	

APPENDIX E

Monitoring and Adaptive Management Plan for Deepwater Horizon NRDA Project:

Grand Bay Land Acquisition and Habitat Management

Table of Contents

1.0 Introduction

Monitoring, Adaptive Management, and Administrative Oversight was identified as one of the programmatic goals in the *Deepwater Horizon* Oil Spill Programmatic Damage Assessment and Restoration Plan and Programmatic Environmental Impact Statement (PDARP/PEIS). The *Deepwater Horizon* NRDA Monitoring and Adaptive Management (MAM) Framework provides a flexible, science-based approach to effectively and efficiently implement restoration over several decades that provides long-term benefits to the resources and services injured by the *DWH* Oil Spill. This project MAM plan identifies the monitoring needed to evaluate progress toward meeting project objectives and to support any necessary adaptive management of the restoration project. It identifies potential sources of uncertainty, incorporates monitoring data and decision points that address these uncertainties, and establishes a decision-making process for making adjustments where needed.

This MAM plan is a living document and will be updated as needed to reflect changing conditions and/or new information. For example, the plan may need to be revised if the project design changes, if initial data analysis indicates that the sampling design is inadequate, or if any uncertainties are resolved or new uncertainties are identified during project implementation and monitoring. Any future revisions to this document will be made publicly available through the Restoration Portal.

1.1 Project Overview

This restoration project is being implemented within the approved acquisition boundary of Grand Bay National Wildlife Refuge (Refuge), Grand Bay National Estuarine Research Reserve (NERR), and the Grand Bay Savanna Coastal Preserve (Coastal Preserve). The project area is located in coastal southeast Mississippi, bordering Grand Bay, and between the municipalities of Grand Bay and Moss Point. Portions of the boundaries of the refuge, NERR and Coastal Preserve overlap (Figure 1.1-1). Restoration activities involve the acquisition of private parcel inholdings and restoration of habitats, where applicable. This project is intended to help restore habitats and resources injured from the DWH Oil Spill, including coastal, estuarine, and riparian habitats; and birds. The United States Department of the Interior (DOI) and Mississippi Department of Environmental Quality (MDEQ) will be the Implementing Trustees and Mississippi Department of Marine Resources (MDMR) will be a project partner.

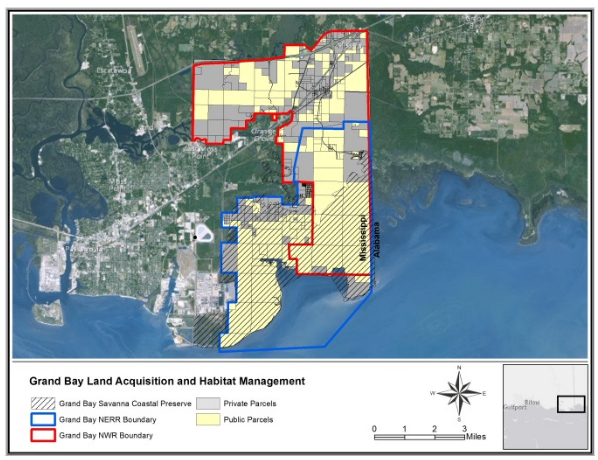

Figure 1.1-1: The Grand Bay Land Acquisition and Habitat Management project area.

This project is being implemented as restoration as part of the *Deepwater Horizon* Oil Spill Natural Resource Damage Assessment (NRDA). As outlined within the *Deepwater Horizon* Oil Spill PDARP/PEIS, this restoration project falls under the following programmatic goal, restoration type, restoration approach, restoration technique, TIG, and restoration plan:

- Programmatic goal: Restore and Conserve Habitats; Replenish and Protect Living Coastal and Marine Resources.
- Restoration type: Wetland, coastal, and nearshore habitats; Birds
- Restoration approaches: Protect and conserve marine, coastal, estuarine, and riparian habitats; Restore and conserve bird nesting and foraging habitat
- Restoration technique: Acquire targeted lands to protect, restore, and manage coastal habitats; Implement management/restoration activities to help restore the natural function and vegetative structure of coastal habitats.
- TIG: Mississippi
- Restoration plan: Mississippi Trustee Implementation Group 2016-2017 Restoration Plan/Environmental Assessment (RP/EA)

1.2 Project Goals and Restoration Objectives

The overall goal of this restoration project is to protect, restore and manage habitat within the project boundaries to maximize native vegetative communities. These actions will help partially restore, replace, or acquire the equivalent of wetland, coastal, and nearshore habitats in Mississippi injured by the Deepwater Horizon spill, and provide services to bird species injured by the spill. The proposal includes two restoration objectives: habitat acquisition and habitat management.

(1) *Habitat acquisition to prevent the potential for habitat loss caused by conversion for development and to increase connectivity in native coastal habitats.* Public ownership of target habitats for this project will help protect them in perpetuity, and facilitate more efficient and effective restoration and management by leading to larger blocks of contiguous habitat which can be managed and protected as a whole. The project objective is to acquire up to 8,000 additional acres of target habitats including coastal marsh, savanna and flatwoods, forested freshwater scrub-shrub, and freshwater marsh in Grand Bay within a 15-year period.

(2) *Habitat management to restore the structure and function of target habitats within the project boundary*. The primary objective of habitat restoration is to restore the structure and function of native vegetation in up to 17,500 acres of target habitats, including coastal marsh, savannas and flatwoods, forested freshwater scrub-shrub, and freshwater marsh in Grand Bay within a 15-year period.

Restoration activities will follow those currently being implemented by the Refuge, NERR and Coastal Preserve and be tailored to the specific needs of individual parcels to help accomplish restoration goals. Habitat management and restoration activities include, but are not limited to, invasive species mapping and treatment (i.e., mechanical treatment, prescribed fire, and chemical treatment), prescribed burning, and mechanical thinning to remove woody vegetation. Fire management and mechanical thinning will serve to replicate the natural ecological processes that historically shaped these coastal ecosystems and will help restore the natural function of each habitat type, assist in providing habitat interconnectivity, and help support the natural expected processes in these habitats (e.g., inland migration of coastal marsh caused by expected sea level rise).

Performance criteria will be used to determine restoration success or the need for corrective action in accordance with15 CFR 990.55(b) (1) (vii)). Specific, measurable performance criteria are defined for monitoring parameters associated with each of the restoration objectives (see Section 2.0).

1.3 Project Activities and Anticipated Outcomes

The singular purpose of conservation is to ensure the protection of habitat from development or further degradation. Conserving land prevents development and disturbances in priority habitats but then allows for the restoration and enhancement of native vegetation assemblages and structure that support coastal, wetland and nearshore habitats in Mississippi, and life cycle needs of birds injured by the spill (Table 1.3-1). The habitats within the project boundary include coastal marsh, savannas and flatwoods, freshwater marsh, and forested freshwater scrub-shrub, among others. Protection of these habitats within this key Gulf Coast watershed will protect downstream natural resources by slowing and filtering nutrient laden runoff, maintain resiliency of dynamic habitats by allowing for free movement in response to changing climate conditions, and provide diverse habitat to serve as refuge for wildlife in the densely populated coastal region. Habitat conservation also enhances habitat connectivity and ties into ecological paradigms of hub and corridors for species movement, habitat migration, and population source sink models. Habitat enhancement of conserved lands through various restoration measures of invasive species removal, restoring hydrological functions (though not contemplated in this plan), and returning fire to the system increases the natural ecosystem functioning of the respective habitats, resulting in a more resilient and sustainable habitat, increased heterogeneity of habitat patches, and thus increases the diversity of the system.

Table 1.3-1: Project Activities and Anticipated Outcomes for the Grand Bay Land Acquisition and Habitat Management Project.

Activity	Output	Short-term outcome	Long-term outcome
• Implement acquisition actions to inhibit development and increase habitat connectivity	• Protection and conservation of priority habitats and birds within the project boundary	• Maintain or increase in habitat connectivity and core areas • Maintain or increase in habitat use by injured bird species	• Protection of key habitats in perpetuity • Enhancement of ecosystem services of Gulf coast habitats and living resources
• Implement management actions on acquired and existing publicly-owned parcels	• Increase natural ecosystem functions	• Increase in native vegetation species composition and desired vegetation structure • Increase in habitat use by injured bird species	• Increase in management of connected habitats • Enhancement of ecosystem services of Gulf coast habitats and living resources

1.4 Sources of Potential Uncertainty

Sources of potential uncertainty, the degree of uncertainty, and the level of uncertainty among projects will vary. Monitoring to resolve potential uncertainties affecting these decisions can allow for more effective expenditure of resources (e.g., optimized project selection) into the future as learning takes place. Further, the learning that takes place through monitoring allows corrective actions to be taken to improve project outcomes. If unresolved, the potential uncertainty may delay the time it takes to achieve the restoration objectives, hinder an implemented project's ability to fully achieve restoration objectives, or in the worst-case scenario, it may have the potential to cause a project to fail altogether, regardless of the corrective actions taken. In this case, the MS TIG is proposing a project that is feasible and has a high likelihood of success. However, potential uncertainties for the project were nonetheless identified and evaluated. These are shown in Table 1.4-1.

Table 1.4-1: Potential uncertainties that may affect success of the Grand Bay Land Acquisition and Habitat Management project.

Uncertainty	**Summary of Strategy to Resolve**
Native vegetation communities do not regenerate after implementation of restoration/management activities.	Conduct targeted monitoring on metrics related to native plant composition and abundance specific to each habitat type (i.e., open pine savanna, forested freshwater scrub-shrub, etc.) and for each restoration/management action (chemical treatment, prescribed fire, mechanical treatment). Monitoring data will be used to refine future management actions.
Injured bird species fail to use designated bird habitat effected by the project.	Consider expanding survey area to document regional presence of survey bird species (are they in the area?). Conduct targeted monitoring on habitat metrics specific to wading bird habitat requirements. Monitoring data will be used to determine the need to implement restoration activities (i.e., prescribed fire, mechanical treatment) and/or if additional wading bird habitat should be acquired.
Targeted habitats do not become available for purchase.	Funding allocated for fee-simple acquisition will be used to implement habitat restoration activities within project boundaries.

2.0 Project Monitoring

The proposed monitoring for this restoration project was developed to evaluate project performance and the need for corrective actions. Information is provided on the intended purpose of each monitoring parameter (e.g., monitor progress toward meeting one of the restoration objectives, regulatory compliance, and support adaptive management of the project), monitoring methods, timing and frequency, duration, sample size, and sites. In addition, performance criteria are defined for each performance monitoring parameter and potential corrective actions that could be taken if the performance criteria are not met.

These parameters will be monitored at the restoration project site and may also be monitored at appropriate reference and/or control sites to demonstrate how the restoration project is trending toward the performance criteria. The parameters listed below may or may not be tied to performance criteria and/or corrective actions.

Objective 1: Acquire targeted land parcels to protect and increase connectivity in coastal habitats.

Objective 2: Implement management activities to help restore and manage the structure and function of native vegetation in coastal habitats.

Parameter #1: Acreage of acquired land, by habitat type - the number of acres acquired through purchase of parcels in the project area.

a) Rationale: Evaluate progress toward meeting Objective 1.
b) Method: This parameter will record the number and location of acres acquired through purchase of targeted parcels within the project boundaries.
c) Timing, Frequency, and Duration: Land acquisitions will be recorded after each purchase and reported at the end of the project or at MS TIG request. Acquisition will occur over a 15-year period as parcels become available.
d) Sample Size: N/A
e) Sites: Acquired parcels
f) Performance Criteria: Fee-simple acquisition of up to 8,000 acres of target habitats within the project boundaries.
g) Corrective Action: Purchase of lands from willing sellers will be subject to negotiations. If, for any reasons, the Implementing Trustees are unable to purchase the parcel, the next available parcel within the project area will be sought and/or funding allocated for fee-simple acquisition could be used to implement habitat restoration activities within project boundaries.

Parameter #2: Presence, relative abundance, status, and distribution of invasive species within the 17,500 acres of target habitats.

a) Rationale: At this time, the extent of invasive species within some of the proposed project boundary is unknown. The intent of this activity is to acquire baseline data on the presence, relative abundance, status and distribution of invasive species in order to effectively develop management strategies focused on removing and/or suppressing infestations. Evaluate progress toward meeting Objective 2.
b) Method: Base-line survey of invasive species within the project boundary will be conducted using aircraft-based digital photography in conjunction with the collection of ancillary field data (i.e., ground-truthing) to identify and map locations of invasive weeds. Areas of closed canopy will be considered for additional ground truthing data collection. Using GPS, polygons will be delineated around patches of invasive weeds and any co-occurring vegetation. Data will be entered into a geographic information system (GIS) for weed management planning purposes. All co-occurring vegetation within the delineated polygon will be identified and recorded following protocols outlined in *National Vegetation Classification Standard, Version 2* (FGDC Document number FGDC-STD-005-2008).
c) Timing and Frequency: Environmental surveys can occur for target habitats in the project boundary prior to management activities being initiated and then again at the end of the project.
d) Sample Size: 2
e) Sites: Project boundary
f) Performance Criteria: N/A
g) Corrective Action: N/A. Data will be used for reporting purposes.

Parameter #3: Vegetation structure

a) Rationale: These metrics will measure project success toward increasing native species composition and desired vegetation structure of restored open pine savanna habitat. Evaluate progress toward meeting Objective 2.
b) Method: The project will adopt the methodologies described in the Field Manual for Rapid Assessment Metrics for Wildlife and Biodiversity in Southern Open Pine Ecosystems (Nordman et al. 2016) for the habitat "Wet Longleaf & Slash Pine Flatwoods & Savannas". Assessment will consist of walking stands along established transects or visits to sets of random points within stands and documenting site characteristics (see Appendix 1). Metric assessment scores will be derived to calculate a score for the canopy, ground layer, and invasive species, and an overall score applied using the metrics provided in Appendix 2 and compared to performance criteria described below.
h) Timing, Frequency, and Duration: Monitoring will be conducted twice per year (growing season and non-growing season) for the first year after treatment and then on an annual basis during the growing season. Inter-annual sampling times may differ based on the timing of restoration actions.
i) Sample Size: Per survey protocols
j) Sites: Targeted and/or acquired pine savanna habitats
k) Performance Criteria:
    i. <20% canopy cover of longleaf or slash pine
    ii. 40-100% herbaceous cover
    iii. Invasive non-native plant species in any stratum present but sporadic (1-5% cover)
l) Corrective Action: Refine or adjust management techniques as necessary to reach performance criteria goals. This may include increasing or decreasing prescribed fire frequency, increasing amount of mechanical removal of canopy species, or an increase in herbicidal treatment.

Parameter #4: Vegetation composition

a) Rationale: These metrics will measure project success toward increasing native species composition of restored open pine savanna habitat. Evaluate progress toward meeting Objective 2.
b) Method: The project will adopt protocols outlined in *Long-Term Vegetational Monitoring at the Mississippi Sandhill Crane National Wildlife Refuge, 1997 (Clewell et al., 1998) and Initial Survey Instructions: Long-term Vegetation Monitoring-Life Form (Clewell Plots)* (Wilder 2016). Four long-term monitoring plots will be established within the project boundaries. Plots will consist of two parallel 200-ft transects spaced 100 ft. apart. Both species composition and community structure surveys will use the point intercept method at 2-foot intervals along each transect (n=200). Species abundance surveys will identify and record all vascular plants rooted within the plot. Community structure surveys will document and record the presence and maximum intercept height for each life form encountered (i.e., grasses, forbs, shrubs, and other). Vegetation cover will be derived by dividing the number of sampling points at which each life form was intercepted by the total. Species

abundance will be measured in terms of species frequency as the number of sampling points along the transect at which each species was recorded.

c) Timing, Frequency, and Duration: Long-term monitoring will rely on both annual surveys documenting changes in the abundance of vegetation life forms (grasses, forbs, and shrubs) and periodic surveys (once within one year after prescribed burns) of plant species composition over time.
d) Sample Size: 4 long-term monitoring plots (two baseline and two treated)
e) Sites: Baseline and treated habitats
f) Performance Criteria: 95% native flora
g) Corrective Action: Refine or adjust management techniques as necessary to reach performance criteria goals. This may include increasing or decreasing prescribed fire frequency, increasing amount of mechanical treatment or removal of canopy species, or an increase in chemical treatment/herbicidal treatment.

Parameter #5: Presence/absence of wintering Henslow's sparrow (*Ammodramus henslowii*)

a) Rationale: Henslow's sparrow are an indicator species of high quality open pine savanna habitat. This metric will measure project success towards the restoration of open pine savanna habitat. Evaluate progress toward meeting Objective 2.
b) Method: The project will adopt protocols outlined in *Project Prairie Birds: A Citizen Science Project for Wintering Grassland Birds* (Shackelford et al. 2001). In short, survey crews of three will include two outside individuals each using bamboo cane poles to beat the vegetation to flush skulking birds. The center person starting at the transect start point and between the pole operators, will aim for the end marker and commence walking while maintaining pole operators' rhythm and position. The center person will monitor the entire transect for birds as they flush in from of the survey line. All three individuals will spot birds and maintain a straight survey line approximately 20 m wide while walking 100 m.
c) Timing, Frequency, and Duration: Surveys will be conducted a minimum of three times per winter season at specific intervals. Surveys will take approximately 90 to 120 seconds per transect.
d) Sample Size: The number of transects will be dependent upon the size of the grassland site. Transects will be 100 m long and approximately 20 m wide.
e) Sites: Pine savanna
f) Performance Criteria: Presence/absence of wintering Henslow's sparrow.
g) Corrective Action: Refine or adjust restoration management activities. This may include increasing or decreasing prescribed fire frequency, increasing amount of mechanical removal of canopy species, or an increase in herbicidal treatment.

Parameter #6: Diversity and abundance of injured bird species in targeted forested freshwater scrub-shrub habitats.

a) Rationale: This metric will measure injured bird species use of bottomland hardwood habitats within the project boundary. Acquisition and protection of this targeted habitat will potentially benefit "wading bird species" with quantified injuries identified in the PDARP. Evaluate progress toward meeting Objective 2.

b) Method: Walking or boating surveys will be conducted along transects within bottomland hardwood habitats. Data collection will include injured bird species identification, species abundance, and location.
c) Timing, Frequency, and Duration: Surveys will occur annually in the spring (March 20 through May 30) and fall (August 20 through October 30).
d) Sample Size: 2 per site/year
e) Sites: Targeted and/or acquired bottomland hardwood habitat
f) Performance Criteria: Use of this habitat by injured bird species.
g) Corrective Action: Consider expanding survey area to document regional presence of survey bird species (are they in the area?). Conduct targeted monitoring on habitat metrics specific to wading bird habitat requirements. Monitoring data will be used to refine future management actions.

3.0 Rationale for Adaptive Management

As discussed in the PDARP/PEIS, adaptive management is a form of structured decision-making applied to the management of natural resources in the face of uncertainty (Pastorok et al. 1997; Williams 2011). It is an iterative process that integrates monitoring and evaluation of management actions with flexible decision-making, where adjustments are made to management approaches based on observed outcomes (NRC 2004). Within the context of ecological restoration, adaptive management addresses key uncertainties by linking science to restoration decision-making (Steyer & Llewellyn 2000).

Although adaptive management is a critical component of the restoration plan as a whole, the need for adaptive management may vary on a project by project basis. For example, higher uncertainty may be associated with novel approaches, larger restoration scales (e.g., number and area of projects), limited scientific understanding of target resources, increasing influence of socioeconomic factors, and longer time scales of restoration implementation (LoSchiavo et al. 2013; Simenstad et al. 2006; Steyer & Llewellyn 2000; Williams & Brown 2012; see PDARP/PEIS for more information). Under OPA NRDA regulations, restoration projects clearly identify performance criteria that will be used to determine project success or the need for corrective action. At a minimum, all project MAM plans should include identification of potential corrective actions. Projects with more uncertainty may require a more active approach to adaptive management.

4.0 Evaluation

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

As part of the larger decision-making context beyond the project scale, the evaluation of monitoring data from the individual projects will be compiled and assessed at the Restoration Type and TIG level, and the results will be used to update the knowledge base to inform decisions such as future TIG project prioritization and selection, implementation techniques, and the identification of critical uncertainties.

The results of the analysis will be used to answer the following questions:

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

Analysis Methods:

Vegetation structure

Recorded metrics will be compared on an annual basis using descriptive summaries to track performance across time by analyzing individual metric scores and final scores for each sampling effort. Comparisons will include canopy cover, ground layer cover, basal area, and invasive species cover.

Vegetation Composition

Data will be analyzed using software capable of calculating general descriptive statistical analyses. Common analyses include:

- Descriptive summaries of cover for grass, forbs, and shrubs. Cover is calculated by dividing the number of intervals at which a life form was measured by the total number of intervals measured.
- Descriptive summaries of mean grass height, mean forb height, mean shrub height, pre- and post-treatment. The mean height of a life form is calculated by dividing the sum of the heights by the total number of interception points at which the life form occurred.
- Multivariate statistics (PCA/perMANOVA) can be applied to detect the degree of similarity of species abundance across space and time (Clewell, 1997).

Injured Bird Species Diversity and Abundance

Data will be analyzed using appropriate software capable of calculating general descriptive statistics.

- Descriptive summaries of bird species abundance (total number of individuals per species per survey) and
- Species diversity (total number of species per survey).

5.0 Project-Level Decisions

An adaptive approach to decision making involves exploring different ways (i.e., alternatives) to meet restoration objectives, predicting the outcomes of those alternatives based on the current state of knowledge, implementing one or more of these alternatives, monitoring to learn about the impacts of alternatives, and then using the results to update knowledge and improve future decisions (DOI Tech Guide). In this section, we describe how updated knowledge gained from the evaluation of monitoring data will be used at the project scale to determine whether the project, once implemented, is considered successful or whether the project requires corrective actions. A project may not be achieving its intended objectives because of previously identified critical uncertainties, unanticipated consequences, previously unknown conditions, or unanticipated environmental drivers. The decision to implement (or not implement) corrective actions is one type of decision within the larger adaptive management decision-making framework.

Learning through monitoring allows for informed corrective actions to be made to the project to achieve desired outcomes. This table identifies corrective actions for each performance criteria (as defined in NRDA regulations (15 CFR 990.55(b) (1) (vii)) but may not include all possible options; rather, it includes a list of potential actions for each individual parameter to be considered if the project is not performing as expected once implemented. Other corrective actions may be identified post-implementation, as appropriate. The decision of whether or not a corrective action should be implemented for a project should holistically consider the overall outcomes of the restoration project (i.e. looking at the combined evaluation of multiple performance criteria) in order to understand why project performance deviates from the predicted or anticipated outcome. The decision to implement a corrective action and the knowledge gained from the process could also inform the larger decision making framework, such as whether prioritization of the restoration technique should change or how to implement the restoration technique to improve the likelihood of achieving favorable project outcomes in future applications.

Table 5.0-1: List of project monitoring parameters, performance criteria, and potential corrective actions.

Monitoring Parameter	**Final Performance Criteria used to determine Project Success**	**Interim Performance Criteria**	**Potential corrective actions or mid-course corrections***
Acquired Acres	Fee-simple acquisition of targeted habitats within project boundary	N/A	Funding allocated for fee-simple acquisition will be used to implement habitat restoration activities within project boundaries.
Vegetation Structure	1) < 20% canopy cover of longleaf or slash pine 2) 40 to 100% herbaceous cover 3) Invasive nonnative plant species in any stratum present but sporadic (1-5 % cover)	Performance criteria not met at year 5 after first treatment	1) Change burn frequency 2) Modify mechanical removal strategy 3) Alter herbicide treatments 4) Explore additional restoration alternatives (e.g., plantings) 5) Continue to monitor.

Monitoring Parameter	**Final Performance Criteria used to determine Project Success**	**Interim Performance Criteria**	**Potential corrective actions or mid-course corrections***
Vegetation composition	90% native flora	Performance criteria not met at year 5 after first treatment	1) Change burn frequency 2) Modify mechanical removal strategy 3) Alter herbicide treatments 4) Explore additional restoration alternatives (e.g., plantings) 5) Continue to monitor.
Presence/Absence Henslow's sparrow	Presence	Presence	Adaptive management will follow that for native vegetation performance criteria
Diversity and abundance of injured bird species on targeted bottomland hardwood habitats	Use of target habitat by injured bird species	Performance criteria not met after 3 years	1) Consider expanding survey area to document regional presence of survey bird species (are they in the area?). 2) Conduct targeted monitoring on habitat metrics specific to wading bird habitat requirements.

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

6.0 Monitoring Schedule

The schedule for the project monitoring is shown in Table 6.0-1, separated by monitoring activity. Execution monitoring relates to baseline surveys (e.g., before habitat acquisition and/or management). Post-execution monitoring occurs in years following treatments (e.g., year 1 = within the first year following a prescribed burn). Performance monitoring will occur in the years following initial project execution (Years 1-5) as depicted in Table 6.0-1. The length of time a parameter is monitored is contingent on when the restoration action is executed within project timeline. Thus, parameters may receive monitoring for 1-5 years. For example, if a parcel is acquired in year 7 of the project, monitoring will occur for three years to coincide with the overall project timeline. Monitoring after the 10 year project timeline will depend on available budget, the timeframe for implementation of restoration measures (Post-execution Year 1, Year 4, Year 5) and Implementing Trustee discretion as to whether monitoring should be extended. The monitoring schedule will be updated as acquisitions are finalized and management actions implemented.

Table 6.0-1: Monitoring Schedule.

Monitoring Parameters	**Monitoring Timeframe**						
	Pre-Execution Monitoring	**Execution Monitoring (initial)**	**Post-Execution Monitoring (years related to those following treatment)**				
		As-built (Year 0)	**Year 1**	**Year 2**	**Year 3**	**Year 4**	**Year 5**
Acquired acres							
Presence, relative abundance, status, and distribution of invasive species within the project boundary	Base-line surveys	x					x
Vegetation structure	Base-line surveys per protocol	x	x	x	x	x	x
Vegetation composition	Base-line surveys per protocol	x	x	x	x	x	x
Henslow’s sparrow presence/absence	Base-line surveys per protocol	x	x	x	x	x	x
Diversity and abundance of injured bird species in targeted bottomland hardwood habitats.	Base-line surveys per protocol	x	x	x	x	x	x

7.0 Data Management

To the extent practicable, all environmental and biological data generated during monitoring activities will be documented using standardized field datasheets. If standardized datasheets are unavailable or not readily amendable to record project-specific data, then project-specific datasheets will be drafted prior to conducting any project monitoring activities. All tangible forms of field data will be reviewed by the Implementing Trustee for completeness and accuracy before being finalized. Original hardcopy datasheets and notebooks and photographs will be retained by the Implementing Trustee.

All field datasheets and notebook entries will be scanned to PDF files and will be archived along with the hardcopy datasheets. 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 will be made and the original preserved.

Relevant Project data that are handwritten on hardcopy datasheets or notebooks will be transcribed (entered) into Excel spreadsheets (or similar digital format). After transcription of the data, a second person not associated with data transcription will perform a verification of the data in the electronic data sheets against the original hardcopy datasheets and/or notebooks, and will make any corrections to transcription errors as appropriate before data are used for any analyses or distributed outside of the agency. Implementing Trustees will verify and validate monitoring data and information and will ensure that all data is entered or converted into agreed upon/commonly used digital format labeled with metadata.

7.1 Data Review and Clearance

Once data is entered electronically it is reviewed and verified for completeness. A quality check is made by verbally comparing the electronic data entered to the original hard copy data sheet. Data are validated and any corrections needed are made. Upon validation, data are approved for analysis, reporting and archiving. All data are kept in one permanent electronic folder as a permanent record.

After any and all identified errors are addressed, data are considered to be QA/QC'd. The Implementing Trustee will give the other TIG members time to review the data before making such information publicly available. Before submitting the monitoring data and information package, co-Implementing Trustees shall confirm with one another that the package is approved for submission. No data release can occur if it is contrary to federal or state laws.

7.2 Data Storage and Accessibility

Trustees will provide DWH NRDA MAM data and information to the MS TIG and the Restoration Portal as soon as possible and no more than 1 year from when data are collected. Once all data has been QA/QC'd it will be submitted to the TIG and stored in the Restoration Project Database managed by the Trustees.

7.3 Data Sharing

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

8.0 Reporting

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

- Summary data – synthesized data for all efforts during the year
- Graphs – vegetation characteristics, acres managed, bird species diversity and abundance, etc.
- Interpretation of graphical data
- Discuss comparison of data if pretreatment and post treatment data are available
- Explanation of results
- Uncertainties with management actions
- Potential data collection issues
- Issues to be resolved
- Issues to improve data collection or cooperation in getting quality data
- Issues associated with data loss or inability to collect data for a time period

9.0 Roles and Responsibilities

The MS TIG is responsible for addressing MAM objectives that pertain to their restoration activities and for communicating information to the Trustee Council or Cross-TIG MAM workgroup. MDEQ and DOI would be Implementing Trustees for the project. DOI will also be the lead federal agency for conducting the environmental evaluation review for implementation. MDMR would be a project partner. The Implementing Trustees' roles include coordination with project partners and the MS TIG to track project progress, program management and oversight, leading acquisition of parcels and MDMR for management operations.

10.0 Monitoring Budget

The overall budget for project monitoring and adaptive management is anticipated to be approximately 10-15% of the total project budget. This budget range is considered to be in draft form and is subject to change as project planning and implementation progress.

11.0 References

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APPENDIX 1

Field Form for Rapid Assessment Metrics for Wildlife and Biodiversity in Southern Open Pine Ecosystems

Date: ____________ **Project:** ____________ **Site ID:** ____________

Field Crew Team Members:
Leader: ______________________________
Assistants:____
Photographer: ______________________ **Photos of Site:** __*AA Centrum out:* _N _E_ S _W ; __*Buffer in*: _N _E _S _W; Add'l: Y / N
Photo filenames:
____
_
Assessment Area Shape: Circle, Rectangle, Square, Polygon **Bearing:** __________
Assessment Area Dimensions: radius 18m, 40m, ______ m/ft. or rectangle ______ m/ft wide x ______m/ft long (fill in values, units)
State:_____County:____________________ Twp:____Range:____Section:____USGS 7.5' Quad:______________________________
Landowner/Managed Area Name:______________________________ **Contact Person**: ______________________________
Stand Name: _____________ Permit Required? ___ Locked Gate? ___ Access Difficulties? (describe)__________________________
SITE DESCRIPTION:

GENERAL DRAWING (Optional): Provide a drawing of the assessment area, including its boundaries, either aerial view or transect view.

LOCATION: Assessment Area CENTRUM (check one)	___ ORIGINAL ___ MOVED (why? how far?)			
GPS Unit:	**GPS Filename:**		**Projection:**	
UTM Zone:	**Datum:** NAD83 WGS84	**GPS Accuracy:** ___ m/ ft	**PDOP:**	**# of Sat's:**
UTM X Easting: __ __ __ __ __ __	**LAT:** decimal degree	*Original (GRTS):*	Field:	Post-processed:
UTM Y Northing: __ __ __ __ __ __ __	**LONG:** decimal degree			

Classification (use to select appropriate Southern Open Pine Metrics Datasheet for page 2 of field form)

Southern Open Pine Grouping:

____

Other Community Classification Reference: _____________________ **Name:**

USNVC Association (Optional):

Classification Comments:

Notes:

APPENDIX 2

Wet Longleaf & Slash Pine Flatwoods & Savannas Metrics Data Sheet					Recorded Measured Value of Metric	Recorded Metric Score (1.0-4.0)
Canopy Metrics						
	Excellent = 4.0	**Good = 3.0**	**Fair = 2.0**	**Poor = 1.0**		
Canopy Southern Yellow Pine Basal Area	20-80 ft^2/acre basal area of longleaf or slash pine	10 to <20 or >80 to <90 ft^2/acre basal area of longleaf or slash pine	5 to <10 or 90 to <100 ft^2/acre basal area of longleaf or slash pine	<5 or $\geq$100 ft^2/acre basal area of longleaf or slash pine	**ft^2/acre BA**	**x0.25**
Southern Yellow Pine Canopy Cover	20-65% canopy cover of longleaf or slash pine	15 to <20% canopy cover or >65-75% canopy cover of longleaf or slash pine	10 to <15% canopy cover or >75-85% canopy cover of longleaf or slash pine	<10% cover or >85% cover of longleaf or slash pine	**% cover**	**x0.25**
Southern Yellow Pine Stand Age Structure	BA $\geq$20 ft^2/acre of flat-top longleaf or slash pine of any diameter and/or longleaf or slash pine trees $\geq$14" DBH class	BA $\geq$10 ft^2/acre of longleaf or slash pine trees $\geq$14" DBH class	Longleaf or slash pine trees $\geq$14" DBH class present, but at <10 ft^2/acre BA	No longleaf or slash pine trees $\geq$14" DBH or with flat-top slash or longleaf pine	**ft^2/acre BA**	**x0.25**
Ground Layer Metrics						
	Excellent = 4.0	**Good = 3.0**	**Fair = 2.0**	**Poor = 1.0**		
Overall Native Herbaceous Ground Cover	40-100% herbaceous cover	30 to <40% herbaceous cover	20 to <30% herbaceous cover	<20% herbaceous cover	**% cover**	**x0.25**
Invasive Plant Presence / Distribution	Invasive nonnative plant species absent or cover is very low ($\leq$1% cover)	Invasive nonnative plant species in any stratum present but sporadic (1-5% cover)	Invasive nonnative plant species in any stratum uncommon (5-10% cover)	Invasive nonnative plant species in any stratum common (>10% cover)	**% cover**	**x0.25**
Final Score is : **Canopy Score _______x0.33 + Midstory Score________x0.33 + Ground Layer Score________x0.33 =** **Evaluation Scale: 4.0 to 3.5 = Excellent, 3.5 to 2.5 = Good, 2.5 to 1.5 = Fair, 1.5 to 1.0 = Poor**					**Ground Layer** **Score =**	

APPENDIX F

Monitoring and Adaptive Management Plan for Deepwater Horizon NRDA Project:

Upper Pascagoula River Water Quality Enhancement

Table of Contents

1.0 Introduction

Monitoring, Adaptive Management, and Administrative (MAM) Oversight was identified as one of the programmatic goals in the *Deepwater Horizon* (*DWH*) oil spill Programmatic Damage Assessment and Restoration Plan and Programmatic Environmental Impact Statement (PDARP/PEIS). The *DWH* NRDA MAM Framework provides a flexible, science-based approach to effectively and efficiently implement restoration over several decades that provides long-term benefits to the resources and services injured by the spill. Project monitoring and adaptive management is important to measure the beneficial impacts of restoration and support restoration decision-making. This project MAM plan identifies the monitoring needed to evaluate progress toward meeting project objectives and to support any necessary adaptive management of the restoration project. It identifies potential sources of uncertainty, incorporates monitoring data and decision points that address these uncertainties, and establishes a decision-making process for making adjustments where needed.

This MAM Plan is a living document and will be updated as needed to reflect changing conditions and/or new information. For example, the plan may need to be revised if the project design changes, if initial data analysis indicates that the sampling design is inadequate, or if any uncertainties are resolved or new uncertainties are identified during project implementation and monitoring. Any significant future revisions to this document will be made publicly available through the Restoration Portal.

1.1 Project Overview

The health of the Gulf of Mexico depends upon the health of its estuaries, and the health of those coastal waters is influenced by land use upstream along tributary rivers. The primary goal for this project is water quality improvement of the Mississippi Sound and other coastal estuarine waters through nutrient reduction. This watershed-scale project restores water quality impacted by the *DWH* oil spill by reducing nutrient load contributions and the sediment carrying them into coastal waters. Runoff from cropland, and pastureland contributes nutrients and sediment that adversely impact the health of coastal waters of the Gulf. While agricultural and pasture lands are not the sole contributors (and in many instances, not the leading contributors) of nutrients to coastal waters, there are tremendous opportunities to address this resource concern at its sources in the Pascagoula basin. Given the success of United States Department of Agriculture (USDA), Natural Resources Conservation Division (NRCS) Farm Bill programs and their strong acceptance by private landowners, there is a significant opportunity to implement conservation practices on private lands. The USDA-NRCS will provide outreach and technical assistance to voluntary participants (landowners), especially on the most vulnerable acres in the watersheds, to develop conservation plans and will use all available conservation practices typically planned and funded by USDA-NRCS programs. The project proposes to implement clusters of projects within the smallest watershed (to the extent practicable) with the goal of making a discernable difference in water quality (at the watershed level). While this targeted and concentrated approach is desired, the projects proponents understand the voluntary nature of conservation implementation and will strive to reach the critical sources within the watershed. The proposed conservation practices will reduce nutrient losses from the landscape; reduce nutrient loads to streams and downstream receiving waters; reduce water quality degradation in watersheds that could provide benefits to marine resources and benefits to coastal watersheds.

This project is being implemented as restoration for the *DWH* oil spill Natural Resource Damage Assessment (NRDA). As outlined within the *DWH* oil spill PDARP/PEIS, this restoration project falls under the following programmatic goal, restoration type, restoration approach, restoration technique, TIG, and restoration plan:

- Programmatic goals: Restore Water Quality
- Restoration type: Nutrient Reduction (Non-Point source)
- Restoration approach: Reduce nutrient loads to coastal watersheds
- Restoration techniques: Agricultural conservation practices; Forestry management practices
- TIG: Mississippi
- Restoration plan: Mississippi Trustee Implementation Group 2016-2017 Restoration Plan/Environmental Assessment (MS TIG 2016-2017 RP/EA)

This restoration project is being implemented within the Pascagoula River basin (HUC 6, 031700) and more specifically in the Chunky-Okatibbee subbasin (HUC 8, 03170001). Subwatersheds include: Chunky River watershed (HUC 10, 0317000157); Tallahatta Creek watershed (HUC 10, 0317000158); Upper Okatibbee Creek watershed (HUC 10, 0317000159) (Note: much of this watershed upstream of a dam was excluded from GIS analysis); Okatibbee Creek watershed (HUC 10, 0317000160); Sowashee Creek watershed (HUC 10, 0317000161).

The monitoring of project parameters is dependent on the voluntary participation by landowners to implement conservation practices on their land. Implemented conservation practices may or may not be located in the same subwatershed, therefore sampling efforts may vary by scale at different watershed levels. This project is intended to reduce nutrient and sediment loads contribution in watersheds that contain Gulf sturgeon (*Acipenser oxyrinchus desotoi*) critical habitat. The Gulf sturgeon is anadromous, spending much of its life in marine environments, but spawning in the Upper Pascagoula River and tributaries. Sediment and other pollutants may reduce Gulf sturgeon spawning success. USDA will be the Implementing Trustee with Mississippi Department of Environmental Quality (MDEQ) and the U.S. Environmental Protection Agency (EPA) as MS TIG Trustees assisting in the project. USDA will work with NRCS (a project partner) and will perform landowner outreach activities and implementation of conservation practices in targeted watersheds.

1.2 Project Goals and Restoration Objectives

Under the Restore Water Quality Programmatic Goal, the MS TIG will focus on the Nutrient Reduction (Nonpoint Source) Restoration Type, and specific goals of the Restoration Type:

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.
2) Where appropriate, co-locate nutrient load reduction projects with other restoration projects to enhance ecological services provided by other restoration approaches.

3) Enhance ecosystem services of existing and restored Gulf Coast habitats.

The specific objectives for this project are:

Objective 1: Reduce sediment, phosphorus, and nitrogen loads during storm events leaving private lands in prioritized watersheds in the Pascagoula Basin;

Objective 2: Identify in-stream habitat features that are influenced by upstream sediment and nutrient loads for future in-stream resource benefits.

Performance criteria will be used to determine restoration success or the need for corrective action in accordance with (15 CFR 990.55(b)(1)(vii)) and are outlined for each objective in Section 2.

1.3 Project Activities and Anticipated Outcomes

This section is intended to explain the general relationships among project activities and anticipated outcomes derived from the implementation. The implementation of conservation practices in agricultural and forestry landscapes are well known management actions that reduce nonpoint source pollutant loads of nutrients and sediment impacting downstream receiving waters (Kröger et al. 2015). Conservation practices will follow the USDA-NRCS paradigm of avoid, control, and trap. Thus, practices are designed to reduce erosion (avoid), slow runoff velocities (control), and increase hydraulic residence time within the field or tract, and/or edge of field (trap), all which are imperative to the physical, chemical, and biological processes that decrease nutrient and sediment loadings (Barlow and Kröger 2014). Utilizing model outputs as well as observational data, conservation practices can be targeted into small watershed areas to produce measurable decreases in nutrients and sediments from the field itself, as well as within the downstream receiving water body. Reducing nutrient and sediment loading to the system is imperative for the functionality of in-stream habitats that are used by aquatic organisms to fulfill critical life history cycles. Increased sediment and nutrient loading in streams can result in siltation of in-stream gravel beds, as well as in low-flow clear water conditions, the proliferation of algae and other periphyton on benthic substrates. Siltation and excessive periphyton growth can cover in-stream gravel beds, which are important spawning habitats for Gulf sturgeon. Targeting conservation practices in high sediment and nutrient yielding watersheds will reduce nutrient and sediment loads entering downstream receiving stream reaches. Habitat mapping to identify potential Gulf sturgeon spawning habitat, and eDNA studies to detect presence/absence of Gulf sturgeon, will be completed as part of this MAM plan in order to relate sediment and nutrient reduction practices to potential Gulf sturgeon presence and spawning activities on potential in-stream habitats.

Table 1.3-1: Project Activities and Anticipated Outcomes for the Upper Pascagoula Water Quality Enhancement Project

Activity	***Output***	***Short-term outcome***	***Long-term outcome***
• Implement conservation practices to reduce nutrient and sediment loading into receiving waters	• Reduced nutrient and sediment loading into the system	• Decrease in nutrient and sediment loadings in targeted watersheds	• Enhancement of ecosystem services of Gulf coast habitats and living marine resources

1.4 Sources of Potential Uncertainty

Sources of potential uncertainty, the degree of uncertainty, and the level of uncertainty among projects will vary. Monitoring to resolve potential uncertainties affecting these decisions can allow for more effective expenditure of resources (e.g., optimized project selection) into the future as learning takes place. Further, the learning that takes place through monitoring allows corrective actions to be taken to improve project outcomes. If unresolved, the potential uncertainty may delay the time it takes to achieve the restoration objectives, hinder an implemented project's ability to fully achieve restoration objectives, or in the worst-case scenario, it may have the potential to cause a project to fail altogether, regardless of the corrective actions taken. In this case, the MS TIG is proposing a project that is feasible and has a high likelihood of success. However, potential uncertainties for the project were nonetheless identified and evaluated. These are shown in Table 1.4-1.

Table 1.4-1: Potential uncertainties that may affect success of the Upper Pascagoula River Water Quality Enhancement Project

Uncertainty	***Summary of Strategy to Resolve***
Conservation practices may not result in measurable change in the receiving waters	Conduct targeted in-stream monitoring at locations that are upstream and downstream of the conservation implementation area. Monitoring data will be used to refine future management actions.
Conservation practices may not result in reduced sediment build-up on in-stream habitat features	Conduct targeted monitoring for gravel beds identified by benthic habitat mapping data. Monitoring data will be used to refine future management actions.
Suitable habitat features for Gulf sturgeon may not exist in the project area	Conduct benthic mapping/sub-bottom profiling activities to locate in-stream gravel beds that may serve as spawning habitat for Gulf sturgeon; Conduct targeted monitoring for Gulf sturgeon presence using eDNA techniques in areas that have the potential to support spawning habitat. Data will be used to refine future management actions.

2.0 Project Monitoring

The proposed monitoring for this restoration project was developed to evaluate project performance. The monitoring parameters, outlined below, are organized by project objective, with one or more monitoring parameters for each objective. Information is provided on the monitoring methods, timing and frequency, duration, sample size, and sites. In addition, example performance criteria for each parameter are identified (if applicable), including example corrective actions that could be taken if the performance criteria are not met. These parameters will be monitored at the restoration project site, in adjacent streams, and may also be monitored at appropriate reference and/or control sites to demonstrate how the restoration project is trending toward the performance criteria. The parameters listed below may or may not be tied to performance criteria and/or corrective actions. Project monitoring will be applied to the following objectives:

Objective 1: Reduce sediment, phosphorus, and nitrogen loads during storm events leaving private lands in prioritized watersheds in the Pascagoula Basin

Parameter #1: Total suspended solids (mg/L) and Turbidity (NTU)

a) Rationale: This parameter will be used to determine whether the conservation practices are successful at meeting Objective 1 of this project and is a required water quality constituent for the NRCS Edge of Field Water Quality Monitoring Data Collection and Evaluation Conservation Activity (Code 201) to measure sediment loads.
b) Methods:
    i. Edge of Field: In-situ water sample collection at site drainage locations using automated collection systems. The system scenario outlined in Edge-of-Field Water Quality Monitoring – Data Collection and Evaluation (201) is considered the "typical system" designed to meet the stated purposes of edge-of-field water quality monitoring. Event Mean Concentration (EMC) and accurate flow (discharge) measurements are required for each runoff event. All systems must be capable of sampling runoff events throughout the year.
    ii. In-stream: Fixed station parameter reading using a data sonde, under baseflow conditions when possible, using standard monitoring protocols will occur at appropriately located upstream and downstream stations that bracket portions of watersheds with conservation practices.
c) Timing, Frequency, and Duration:
    i. Edge of Field: Data will be collected for storm events using an automated sampler across a hydrograph. Sites will be visit at least once per week or on alternating weeks when sampling events are not anticipated to maintain equipment and ensure proper functioning of the collection system. After collection events, sites will be visited as soon as possible after sampling events to retrieve samples, inspect flow measurement and automated sampler function, and make necessary repairs. Excessive delay in retrieving water samples can result in changes to their chemical composition and thus inaccurate representation of actual water quality.
    ii. In-stream: Ten samples per year will be collected at one or more sets of one upstream and two downstream stations that bracket portions of watersheds with conservation practices. Samples when possible, will be taken at baseflow conditions.
    iii. Duration of the project: 5 years.
d) Sample Size: A paired design will be used at each conservation practice implementation site monitored. The total number of sites is not yet determined. A paired approach provides for a determination of conservation practice effectiveness by comparing a control field and a treatment field that are similar in terms of soil, slope, vegetation, hydrology, initially receive identical management, and receive the same weather (e.g., precipitation events) (Clausen and Spooner 1993). Monitor both fields (watersheds) under identical crop and management conditions without any new practice implementation during the baseline period. Follow this with monitoring of both fields after conservation practice implementation in the treatment field. The monitoring regime (i.e., sample location, method, and frequency) must remain the same through both baseline and post-implementation periods.

e) Sites: Conservation practice implementation will be dependent on the participation of landowners in the target watersheds described in section 1.1. Locations will be updated in the monitoring plan when landowners sign participation agreements with the NRCS. Site selection criteria will adhere to the guidelines stated in the NRCS Edge of Field Water Quality Monitoring Data Collection and Evaluation Conservation Activity (Code 201). The geographic scope of the in-stream monitoring design will depend on the location of lands enrolled in the conservation program. Where a large number of acres are co-located in a small watershed (e.g. HUC 12), the design will likely include one upstream station (could be optional depending on upstream conditions) and one or more downstream stations (near-field and further downstream) depending on the location of the cluster of conservation practices.
f) Performance Criteria: x kg of suspended sediments trapped from treatment site
g) Corrective Action: Actions will vary depending on the type of conservation practice that is implemented. Some conservation practices may require inspection and maintenance. Information on the operations and maintenance of conservation practices can be found at http://www.nrcs.usda.gov/wps/portal/nrcs/detailfull/national/technical/cp/ncps/?cid=nrcs143_026849.

Parameter #2: Total phosphorus (mg/L)

a) Rationale: This parameter will be used to determine whether the restoration actions are successful at meeting Objective 1. This parameter is a required water quality constituent for the NRCS Edge of Field Water Quality Monitoring Data Collection and Evaluation Conservation Activity (Code 201).
b) Method(s):
    i. Edge of Field: In-situ water sample collection at site drainage locations using automated collection systems. The system scenario outlined in Edge-of-Field Water Quality Monitoring – Data Collection and Evaluation (201) is considered the “typical system” designed to meet the stated purposes of edge-of-field water quality monitoring. Event Mean Concentration (EMC) and accurate flow (discharge) measurements are required for each runoff event. All systems must be capable of sampling runoff events throughout the year.
    ii. In-stream: Sample collection using standard monitoring protocols will occur at appropriately located upstream and downstream stations that bracket portions of watersheds with conservation practice(s).
c) Timing, Frequency, and Duration:
    i. Edge of Field: Data will be collected for storm events using an automated sampler across a hydrograph. Sites will be visit at least once per week or on alternating weeks when sampling events are not anticipated to maintain equipment and ensure proper functioning of the collection system. After collection events, sites will be visited as soon as possible after sampling events to retrieve samples, inspect flow measurement and automated sampler function, and make necessary repairs. Excessive delay in retrieving water samples can result in changes to their chemical composition and thus inaccurate representation of actual water quality.

ii. In-stream: Ten samples per year will be collected at one or more sets of one upstream and two downstream stations that bracket portions of subwatersheds, especially where conservation practices are densely co-located.
iii. Duration of the project: 5 years.

d) Sample Size:
   i. Edge of Field: A paired design will be used at each conservation practice implementation site. The total number of sites is not yet determined. A paired approach provides for a determination of conservation practice effectiveness by comparing a control field and a treatment field that are similar in terms of soil, slope, vegetation, hydrology, initially receive identical management, and receive the same weather (e.g., precipitation events) (Clausen and Spooner 1993). Monitor both fields (watersheds) under identical crop and management conditions without any new practice implementation during the baseline period. Follow this with monitoring of both fields after conservation practice implementation in the treatment field. The monitoring regime (i.e., sample location, method, and frequency) must remain the same through both baseline and post-implementation periods.
   ii. In-stream: Samples for MDEQ's Ambient Fixed Station Monitoring QAPP (MDEQ 2015) will be collected off bridges where possible that cross the water bodies in question or in wadable streams if needed. The total number of sites is not yet determined and will be dependent on the amount and location of conservation practices in the targeted watersheds. It is anticipated that a total of 10 samples will be collected per year at each station. Samples will be taken at baseflow conditions when possible.

e) Sites: Conservation practice implementation will be dependent on the participation of landowners in the target watersheds described in section 1.1. Locations will be updated in the monitoring plan when landowners sign participation agreements with the NRCS. Site selection criteria will adhere to the guidelines stated in the NRCS Edge of Field Water Quality Monitoring Data Collection and Evaluation Conservation Activity (Code 201). The geographic scope of the in-stream monitoring design will depend on the location of lands enrolled in the conservation program. Where a large number of acres are co-located in a small watershed (e.g. HUC 12), the design will likely include one upstream station (could be optional depending on upstream conditions) and one or more downstream stations (near-field and further downstream) depending on the location of the cluster of conservation practices.

f) Performance Criteria: x kg of phosphorus trapped from treatment site

g) Corrective Action: Actions will vary depending on the type of conservation practice that is implemented. Some conservation practices may require inspection and maintenance. Information on the operations and maintenance of conservation practices can be found at http://www.nrcs.usda.gov/wps/portal/nrcs/detailfull/national/technical/cp/ncps/?cid=nrcs143_026849

Parameter #3: Total Nitrogen (mg/L)

a) Rationale: This parameter will be used to determine whether the restoration actions are successful at meeting Objective 1. This parameter is a required water quality constituent for the NRCS Edge of Field Water Quality Monitoring Data Collection and Evaluation Conservation Activity (Code 201).

b) Method(s):
   i. Edge of Field: In-situ water sample collection at site drainage locations using automated collection systems. The system scenario outlined in Edge-of-Field Water Quality Monitoring – Data Collection and Evaluation (201) is considered the "typical system" designed to meet the stated purposes of edge-of-field water quality monitoring. Event Mean Concentration (EMC) and accurate flow (discharge) measurements are required for each runoff event. All systems must be capable of sampling runoff events throughout the year.
   ii. In-stream: Sample collection using standard monitoring protocols will occur at appropriately located upstream and downstream stations that bracket portions of subwatersheds, especially where conservation practices are densely co-located.

c) Timing, Frequency, and Duration:
   i. Edge of Field: Data will be collected for storm events using an automated sampler across a hydrograph. Sites will be visit at least once per week or on alternating weeks when sampling events are not anticipated to maintain equipment and ensure proper functioning of the collection system. After collection events, sites will be visited as soon as possible after sampling events to retrieve samples, inspect flow measurement and automated sampler function, and make necessary repairs. Excessive delay in retrieving water samples can result in changes to their chemical composition and thus inaccurate representation of actual water quality.
   ii. In-stream: Ten samples per year will be collected at one or more sets of one upstream and two downstream stations that bracket portions of subwatersheds, especially where conservation practices are densely co-located. Samples will be taken at baseflow conditions when possible.
   iii. Duration of the project: 5 years.

d) Sample Size:
   i. Edge of Field: A paired design will be used at each conservation practice implementation site. The total number of sites is not yet determined. A paired approach provides for a determination of conservation practice effectiveness by comparing a control field and a treatment field that are similar in terms of soil, slope, vegetation, hydrology, initially receive identical management, and receive the same weather (e.g., precipitation events) (Clausen and Spooner 1993). Monitor both fields (watersheds) under identical crop and management conditions without any new practice implementation during the baseline period. Follow this with monitoring of both fields after conservation practice implementation in the treatment field. The monitoring regime (i.e., sample location, method, and frequency) must remain the same through both baseline and post-implementation periods.
   ii. In-stream: Samples for MDEQ's Ambient Fixed Station Monitoring QAPP (MDEQ 2015) will be collected off bridges where possible that cross the water bodies in question or in wadable streams if needed. The total number of sites is not yet determined and will be dependent on the amount and location of conservation practices in the targeted watersheds. It is anticipated that a total of

10 samples will be collected per year at each station. Samples will be taken at baseflow conditions when possible.

e) Sites: Conservation practice implementation will be dependent on the participation of landowners in the target watersheds described in section 1.1. Locations will be updated in the monitoring plan when landowners sign participation agreements with the NRCS. Site selection criteria will adhere to the guidelines stated in the NRCS Edge of Field Water Quality Monitoring Data Collection and Evaluation Conservation Activity (Code 201). The geographic scope of the in-stream monitoring design will depend on the location of lands enrolled in the conservation program. Where a large number of acres are co-located in a small watershed (e.g. HUC 12), the design will likely include one upstream station (could be optional depending on upstream conditions) and one or more downstream stations (near-field and further downstream) depending on the location of the cluster of conservation practices.
f) Performance Criteria: x kg of nitrogen trapped from treatment site
g) Corrective Action: Actions will vary depending on the type of conservation practice that is implemented. Some conservation practices may require inspection and maintenance. Information on the operations and maintenance of conservation practices can be found at http://www.nrcs.usda.gov/wps/portal/nrcs/detailfull/national/technical/cp/ncps/?cid=nrcs143_026849.

Parameter #4: Benthic Substrate

a) Rationale: This parameter is required to identify potential suitable spawning habitat for Gulf sturgeon in the study area in order to document additional ecosystem benefits of the project. Benthic substrate types will be delineated to illustrate spatial heterogeneity of riverine substrates.
b) Method: Utilize Swath Bathymetric and Sub-Bottom Profiling Systems that are capable of detecting locations of gravel beds and sub-surface materials. Habitats will be ground-truthed in areas that are wadable for accuracy assessment.
c) Timing, Frequency, and Duration: Data will be collected in one survey event to reduce potential variability in water volumes over time. Survey duration has to be determined and will depend on the number and location of conservation practice sites in the study area.
d) Sample Size: 100% bathymetric coverage of waterways located adjacent to conservation practices identified in Objective 1.
e) Sites: Locations will be dependent on the locations of participating landowners in the target watersheds described in section 1.1. Locations will be updated in the monitoring plan when landowners sign participation agreements with the NRCS.
f) Corrective Action: not applicable

Parameter #5: Gulf sturgeon eDNA samples

a) Rationale: This parameter is required to determine the presence and specific locations of Gulf sturgeon in the project area waterways.
b) Method: Water samples will be collected at strategic locations using 150 meter transects. One liter water samples will be collected at 0, 75, and 150 meters along the transect.

Environmental DNA collection methods will follow the procedure outlined by Pfleger et al. (2016). At each site, three sites replicates will be sampled. Quality control measures, such as sterile technique for collecting and decontamination will be taken at each site to avoid contamination and reduce the possibility of false positives. Collected samples will be immediately placed on ice in a sterilized source cooler storage container to prevent DNA degradation.

c) Timing, Frequency, and Duration: Data will be collected annually during the spring migration for Gulf sturgeon (April-August). Single event sampling efforts will occur at each site once per month during the migration time period. Subsequent laboratory analysis will take place after samples have been collected and stored. Sampling will occur for five years.
d) Sample Size: Transect samples will be collected at a broad level to cover the entire waterways of the Okatibbee and Chunky rivers. Sampling will occur every 5 kilometers from the mouth of each waterway, upstream until waters become unnavigable. This includes approximately 60 km of the Okatibbee and approximately 40 km of the Chunky. The sample size equals 12 and 8, respectively. Over a 5-month period (migration), the total number of sample events equals 100. Locations will be refined for sampling after benthic habitat data has been analyzed for potential spawning habitat. eDNA sampling efforts will then concentrate specifically on these areas.
e) Sites: Locations will be dependent on the locations of participating landowners in the target watersheds described in section 1.1. Locations will be updated in the monitoring plan when landowners sign participation agreements with the NRCS.

3.0 Rationale for Adaptive Management

Implementation of the conservation practices, benthic investigations and eDNA monitoring and evaluation will utilize standardized actions using accepted tools and protocols at specific locations (NRCS, 2012; Pfleger 2016). Although adaptive management is a critical component of the restoration plan as a whole, the need for adaptive management on specific conservation practices being implemented is not needed for this project due to the nature of the sampling approaches, the objectives of the project, and the scale of the sites in which the data will be collected (crop field scale; waterway segment scale), and an understanding of the conservation practices that will be applied. Data, analysis and information obtained from this project will be used to help inform future Restoration Plan development, priorities and project selection.

4.0 Evaluation

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

The results of the analysis will be used to answer the following questions:

- Were the project restoration objectives achieved? If not, is there a good reason why they were not met?
- Did the restoration project produce unanticipated effects?
- Were there unanticipated events unrelated to the restoration project that potentially

affected the monitoring results?

- Were any of the uncertainties identified prior to project implementation resolved?
- Were any new uncertainties identified?

The analysis methods will be applied to all monitoring parameters as follows:

Water Quality Data

Edge of Field:

Paired field data are often analyzed by Analysis of Covariance (ANCOVA), a procedure that combines linear regression with Analysis of Variance (ANOVA) (Grabow et al. 1998). The USEPA recommends an ANCOVA model for paired watershed data analysis, using matched event loads from control and treatment watersheds to determine effects of conservation practices (USEPA 1993; USEPA 1997).

In-stream:

Standard analytical techniques will be used to document water quality improvements between upstream and downstream stations that bracket project areas with conservation systems and follow the guidelines provided in MDEQ's Ambient Fixed Station Monitoring quality assurance project plan (QAPP) (MDEQ 2015). This QAPP has been prepared according to the requirements and guidance provided in the following documents:

USEPA Requirements for Quality Assurance Project Plans, (USEPA QA/R-5 EPA/240/B-01/003)) U.S. Environmental Protection Agency, Office of Environmental Information, Washington, D.C., March 2001 and USEPA Guidance for Quality Assurance Project Plans, (USEPA QA/G5 EPA/240/R-02/009), U.S. Environmental Protection Agency, Office of Environmental Information, Washington, D.C., December 2002.

Benthic Habitat Mapping

Multibeam bathymetric data will be processed in CARIS HIPS or similar software and delivered in Bathymetric Attributed Grid (BAG) format. Grid resolution will be 0.25 meter. Depth, uncertainty, and coverage data will be included with each BAG. The gridded bathymetry data will be used to generate an ESRI shapefile of 1 foot contours. Bathymetric grids will also be used for 3D volumetric analyses.

Multibeam backscatter data will be processed in CARIS SIPS and delivered in georeferenced tagged image file format (GeoTIFF). Sub-bottom profiler data will be processed and interpreted in SonarWiz, or similar software. Along-track seismic reflection profiles will be delivered in TIFF image format. An ESRI shapefile of the sub-bottom profiler trackline will be included. Raw sub-bottom profiler files will also be delivered in native JSF format. Acreages of gravel beds will be delineated in a GIS system using the processed data.

eDNA

DNA extraction methods should follow the best available science. Procedures outlined in Pfleger (2016) resulted in positive DNA hits for both Gulf sturgeon and Alabama sturgeon. Specific numbers of positives and negatives by site per month will be documented and graphed so that a comparative analysis of sites and timing (month) can be analyzed. Additionally, site characteristics will be analyzed with benthic habitat data to better understand species presence and habitat relationships.

4.1 Project-Level Decisions

The need for adaptive management on specific conservation practices being implemented beyond inspection and maintenance is not needed for this project. Monitoring information from this restoration project will be critical to refine targeting of conservation practice implementation, refine potential in-stream habitat that could be used by Gulf sturgeon if found, as well as identify in-stream habitat that could be enhanced by conservation practices for Gulf sturgeon as needed.

5.0 Monitoring Schedule

The schedule for the project monitoring is shown in Table 5.0-1, separated by monitoring activity. Execution monitoring occurs when the project has been fully executed as planned (Year 0).

<u>Performance monitoring for Objective 1:</u> The monitoring of project parameters is dependent on the voluntary participation by landowners to implement conservation practices. Performance monitoring will occur in the years following initial project execution (Years 1-5), but is restrained by the five-year duration of the overall project. The length of time a conservation practice is monitored is contingent on when the treatment is executed within project timeline. Thus, treatments may receive monitoring for 1-5 years. However, it is anticipated that project sites will execute treatments in the second year following project planning and outreach to landowners. The monitoring schedule will be updated as conservation practices are planned and implemented.

<u>Benthic habitat mapping and eDNA sampling:</u> Benthic habitat mapping will occur in year 1 of the project and will be conducted as a single event. eDNA sampling will occur every 5 kilometers from the mouth of each waterway, upstream until waters become unnavigable in year 1 of the project for the broad level analysis of potential Gulf sturgeon presence. Locations will be refined for sampling after benthic habitat data has been analyzed for potential spawning habitat. eDNA sampling efforts will then concentrate specifically on these areas in subsequent monitoring years to account for potential inter-annual migration shifts. eDNA sampling will occur annually for the duration of the project to maximize detection of the potential presence of Gulf sturgeon and the relationship of that potential presence to possible habitat use by Gulf sturgeon, in response to in-stream changes from conservation practice implementation.

Table 5.0-1: Monitoring Schedule.

Monitoring Parameters	***Monitoring Timeframe***					
	Execution Monitoring (initial)	***Post-Execution Monitoring (ongoing)***				
	As-built (Year 0)	***Year 1***	***Year 2***	***Year 3***	***Year 4***	***Year 5***
Parameters 1,2,3		X	X	X	X	X
Parameter 4		X				
Parameter 5		X	X	X	X	X

6.0 Data Management

To the extent practicable, all environmental and biological data generated during monitoring activities will be documented using standardized field datasheets. If standardized datasheets are unavailable or not readily amendable to record project-specific data, then project-specific datasheets will be drafted prior to conducting any project monitoring activities. All tangible forms of field data will be reviewed by Implementing Trustee for completeness and accuracy before being finalized. Original hardcopy datasheets and notebooks and photographs will be retained by the Implementing Trustee.

All field datasheets and notebook entries will be scanned to PDF files and will be archived along with the hardcopy datasheets. 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.

Relevant project data that are handwritten on hardcopy datasheets or notebooks will be transcribed (entered) into Excel spreadsheets (or similar digital format). After transcription of the data, a second person not associated with data transcription will perform a verification of the data in the electronic data sheets against the original hardcopy datasheets and/or notebooks, and will make any corrections to transcription errors as appropriate before data are used for any analyses or distributed outside of the agency. Implementing Trustees will verify and validate monitoring data and information and will ensure that all data is entered or converted into agreed upon/commonly used digital format labeled with metadata.

6.1 Data Review and Clearance

All components of this project will be subject to the formal Quality Management Program developed by Mississippi Department of Environmental Quality (MDEQ 2014). This program dictates that all data collection and monitoring efforts be performed under a project specific Quality Assurance Project Plan (QAPP). To meet this requirement, MDEQ will provide a Comprehensive Quality Assurance Plan (CompQAP) for all the project activities. Quality Assurance procedures for this monitoring plan, all field methods and associated data collection, recording and storage efforts will be included in the CompQAP. This document will be used to ensure that environmental and related data collected, compiled, and/or generated for this project are of the type, quantity, and quality required for their intended purpose.

Water Quality Data Collection

Edge of Field:

Data will be QA/QC'd in accordance with procedures outlined in the NRCS Edge of Field Water Quality Monitoring Data Collection and Evaluation Conservation Activity (Code 201). A QAPP is required for NRCS-assisted water quality monitoring and must be used as the basis of the QAPP when NRCS is the lead funding agency. Among other items, a QAPP will fully describe the process of sample preservation, handling, and processing. The QAPP documents the results of a project's technical planning process, providing in one place a clear, concise, and complete plan for the environmental data operation and its quality objectives and identifying key project personnel.

In-stream:

Appropriate QA procedures from MDEQ's Ambient Fixed Station Monitoring quality assurance project plan (QAPP) (MDEQ 2015) will be used for in-stream monitoring. This QAPP presents the sampling, analytical, QC requirements for the Ambient Fixed Station Monitoring program conducted under the CWA §106. The QAPP requirements are designed to ensure reproducible and defensible data are generated for use in surface water assessments

Benthic Mapping Data Collection

The quality of hydrographic data depends on precise calibration and maintenance of the accuracy through automatic calibration techniques and periodic verification of the results through data monitoring and statistical analyses of data sets. The quality control system for this project is designed to continuously monitor data quality and query system conditions, which allows for the delivery of high-quality data products. Thus, in addition to the quality control plan described below, there will be near real-time quality control of data in the field as it is acquired. A QA/QC plan for hydrographic data collection will be required before data collection occurs.

eDNA Collection

Protocols should adhere to Mahon et al. (2010) Environmental DNA Monitoring and Surveillance: Standard Operation Procedures. Report to the United States Army Corps of Engineers, Environmental Laboratories, and Cooperative Environmental Studies Unit, Vicksburg, Mississippi or similar protocol that is applicable to the habitat type. Additionally, numerous scientific manuscripts outline protocols for data methods, quality and control.

Data will be QA/QC'd in accordance with procedures outlined in the QA/QC Clearance and Release document approved by the Trustees.

To the extent practicable, all environmental and biological data generated during monitoring activities will be documented using standardized field datasheets. If standardized datasheets are unavailable or not readily amendable to record project-specific data, then project-specific datasheets will be drafted prior to conducting any project monitoring activities. All tangible forms of field data will be reviewed by Implementing Trustee for completeness and accuracy before being finalized. Original hardcopy datasheets and notebooks and photographs will be retained by the Implementing Trustee.

All field datasheets and notebook entries will be scanned to PDF files and will be archived along with the hardcopy datasheets. 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.

Relevant Project data that are handwritten on hardcopy datasheets or notebooks will be transcribed (entered) into Excel spreadsheets (or similar digital format). After transcription of the data, a second person not associated with data transcription will perform a verification of the data in the electronic data sheets against the original hardcopy datasheets and/or notebooks, and will make any corrections to transcription errors as appropriate before data are used for any analyses or distributed outside of the agency. Implementing Trustees will verify and validate MAM data and information and will ensure that all data is entered or converted into agreed upon/commonly used digital format labeled with metadata following FGDC/ISO standards to the extent practicable and in accordance with individual agency requirements.

After any and all identified errors are addressed, data are considered to be QA/QC'd. The Implementing Trustee will give the other TIG members time to review the data before making such information publicly available. Before submitting the monitoring data and information package, co-Implementing Trustees shall confirm with one another that the package is approved for submission. No data release can occur if it is contrary to federal or state laws.

6.2 Data Storage and Accessibility

Once all data has been QA/QC'd it will be submitted to the Restoration Project Database that is held at MDEQ.

6.3 Data Sharing

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

7.0 Reporting

Water Quality

Edge of Field:

For each water quality station, rainfall and flow data will accompany electronic (.pdf) copies of the laboratory analysis for each event. Weekly or bi-weekly checklists and/or a log book should provide information about the performance of the monitoring system, specifically noting any malfunctions, gaps in data collection, or conditions that might be useful in interpreting the results of collected data. The operations form should be completed for the reporting period. Weekly or bi-weekly photos of the field and the system will be provided digitally. An Excel spreadsheet containing all water quality data for all the events of the reporting period will be submitted. All information in this paragraph is required as the documentation for a semi-annual data submittal.

The annual submittal includes all requirements of a semi-annual data submittal for the second half of the monitoring year. In addition, this report will summarize the findings for the year and will include a status review with the participant. The data should be summarized in such a way that it is meaningful to the participant. NRCS must complete a quality assurance check of existing practice management known as the Annual Field Check form. All information in this paragraph is required as the documentation for an annual submittal. The report should include:

- Summary data –Tabular
- Graphs – Discharge (cfs), Runoff (inches) and Load (lbs/acre)
- Interpretation of graphical data
- Discuss comparison of control and treatment sites
- Explain Results
- Event mean concentration (EMC) vs. discharge
- Unexpected events (data outliers)
- Explain the difference between nutrient inputs and nutrient loads leaving the field (lbs/acre)
- Potential data collection issues
- Issues to be resolved
    - Issues to improve data collection or cooperation in getting quality data
    - Issues associated with data loss or inability to collect data for a time period (due diligence)

In-stream:

Field data, field observations and analytical data will be compiled and presented via paper and electronic means. Reporting will include: methodology, including describing field and analytical methods; tabulation of analytical results and field measurements, a QA/QC summary; and a discussion addressing problems, corrective actions, or other characteristics of the data that are required for scientifically sound interpretation of the data. This information will be provided to the project administration by the PM and the Project Data Manager on a quarterly basis.

The monitoring reports will be prepared for each sample collected and include the following items:

- Site identification and location information;
- *in situ* field measurements;
- Analytical results, including analytical methods and dates of analyses; and
- Any additional observations recorded on the sample collection field forms.

Data Quality Reports will include the following:

- Summary of analytical results, including a summary of QA/QC data (i.e., results of field duplicates, analytical duplicates, spikes, and blanks);
- Methods of data analysis; and

- Tabular summaries of all direct and non-direct measurements.

Benthic Habitat Mapping

Progress reports will be submitted to the project lead on a weekly basis to detail progress to date, in addition to current and anticipated survey schedule. A Data Acquisition and Processing Report (DAPR) will be submitted along with mapping deliverables after the conclusion of the field effort.

eDNA

Progress reports will be submitted to the project lead on a weekly basis to detail progress to date, in addition to current and anticipated sampling schedule. A final laboratory report will be submitted that includes all raw data and analysis results.

8.0 Roles and Responsibilities

The Mississippi TIG is responsible for addressing MAM objectives that pertain to their restoration activities and for communicating information to the Trustee Council or Cross-TIG MAM work group.

At the project level, USDA would be the lead Implementing Trustee for the project working with other Trustees and with NRCS as a project partner. MDEQ and EPA will assist in monitoring the project. USDA will also be the lead federal agency for conducting the environmental evaluation review for implementation. USDA working with NRCS will perform landowner outreach activities and implementation of conservation practices in targeted watersheds. MDEQ’s primary roles includes coordination with project partners and the MS TIG to track project progress, program management and oversight, lead for edge of field sampling, and provide a Comprehensive Quality Assurance Plan (CompQAP) for all of the project activities. USDA will lead coordination with landowners and implementation of conservation practices. USEPA will provide coordination support as well as take the lead on in-stream water quality monitoring in the field under the MDEQ CompQAP; the MDEQ laboratory will process and analyze the total nitrogen and total phosphorus samples taken in-stream.

9.0 Monitoring and Adaptive Management Budget

The overall budget for project monitoring is anticipated to be approximately 10-15% of the total project budget. This budget range is considered to be in draft form and is subject to change as project planning and implementation progress. Adaptive management is not a component of this project and is not included in the budget.

10.0 References

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Clausen, J. C., & Spooner, J. 1993. Paired watershed study design (No. PB-94-154820/XAB; EPA--841/F-93/009). Environmental Protection Agency, Washington, DC (United States). Office of Wetlands, Oceans and Watersheds.

Grabow, G. L., Spooner, J., Lombardo, L. A., Line, D. E., & Tweedy, K. L. 1998. Has water quality improved? Use of SAS for Statistical Analysis of Paired Watershed, Upstream/Downstream, and Before/After Monitoring Designs. Biological and Agricultural Engineering Department, North Carolina State University, Raleigh, NC. USEPA-NCSUCES Grant, (X825012).

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MDEQ. 2015. Quality Assurance Project Plan for Ambient Fixed Station Monitoring. This quality assurance project plan (QAPP) has been prepared according to the requirements and guidance provided in the following documents: USEPA Requirements for Quality Assurance Project Plans, (USEPA QA/R-5 EPA/240/B-01/003)) U.S. Environmental Protection Agency, Office of Environmental Information, Washington, D.C., March 2001 and USEPA Guidance for Quality Assurance Project Plans, (USEPA QA/G5 EPA/240/R-02/009), U.S. Environmental Protection Agency, Office of Environmental Information, Washington, D.C., December 2002.

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USEPA. 1997. Monitoring guidance for determining the effectiveness of nonpoint-source controls. EPA 841-B-96-004. Washington, D.C.

FINDING OF NO SIGNIFICANT IMPACT (FONSI)
From Implementation of the
Mississippi Trustee Implementation Group 2016-2017 Restoration Plan

Introduction

The "Mississippi Trustee Implementation Group 2016-2017 Final Restoration Plan and Environmental Assessment" (RP/EA) fulfills the restoration plan requirement under the Oil Pollution Act (OPA) and the implementing regulations, and the environmental assessment requirement for compliance with the National Environmental Policy Act (NEPA). It was prepared by the Mississippi Trustee Implementation Group (MS TIG) to partially address injuries to natural resources and their services in the Mississippi Restoration Area caused by the *Deepwater Horizon* (DWH) oil spill using Natural Resource Damage funds as set forth in the DWH post-settlement Consent Decree[1]. The RP/EA proposes to implement projects to restore and conserve habitat, replenish and protect living coastal and marine resources, and restore water quality. The document analyzes six alternatives to achieve these goals, as well as a No Action Alternative.

Under OPA, as set forth in the DWH Consent Decree and as described in the 2016 DWH Trustees' Programmatic Damage Assessment and Restoration Plan/Programmatic Environmental Impact Statement (PDARP/PEIS), the MS TIG comprises the following state and federal Natural Resource Trustees Agencies: the Mississippi Department of Environmental Quality; the United States Department of Commerce, represented by the National Oceanic and Atmospheric Administration (NOAA); the United States Department of the Interior (DOI), represented by the United States Fish and Wildlife Service (FWS); the National Park Service (NPS), and the Bureau of Land Management (BLM); the United States Department of Agriculture (USDA); and the United States Environmental Protection Agency (EPA).

The RP/EA tiers from the PDARP/PEIS, which is a programmatic document developed by the DWH Trustees to guide and direct the massive DWH oil spill restoration effort. The PDARP/PEIS was prepared in accordance with OPA, NEPA, Council on Environmental Quality (CEQ) NEPA regulations, and the NEPA procedures and guidance applicable to MS TIG federal Trustees. The PDARP/PEIS includes a portfolio of Restoration Types that addresses the diverse suite of injuries that occurred at both regional and local scales. Consistent with that programmatic restoration plan, this RP/EA focuses on implementing projects in the Mississippi

[1] On April 4, 2016, the Court entered the final Consent Decree negotiated among BP and the Trustees. The Consent Decree settles damages, including natural resource damages as defined under the Oil Pollution Act (OPA) of 1990, in a federal case arising from matters related to the DWH oil spill: *United States v. BPXP et al., Civ. No. 10-4536, centralized in MDL 2179, In re: Oil Spill by the Oil Rig "Deepwater Horizon" in the Gulf of Mexico, on April 20, 2010 (E.D. La.)*

Restoration Area to address three of the five overarching goals set forth in the PDARP/PEIS (Restore and Conserve Habitat; Replenish and Protect Living Coastal and Marine Resources; and Restore Water Quality) and three Restoration Types associated with these goals: Wetlands, Coastal and Nearshore Habitats (WCNH); Birds; and Nutrient Reduction (Nonpoint Source).

Lead and Cooperating Agencies

The Council on Environmental Quality's NEPA implementing regulations (40 CFR 1500-1508) require a federal agency to serve as lead agency to supervise the NEPA analysis when more than one federal agency is involved in the same action (40 CFR 1501.5(a)). The MS TIG designated the USDA as the lead agency responsible for NEPA analysis for the RP/EA. Each of the other federal and state co-Trustees are participating as a cooperating agency pursuant to NEPA (40 CFR § 1508.5) and the "*Trustee Council Standard Operating Procedures for Implementation of the Natural Resource Restoration for the Deepwater Horizon (DWH) Oil Spill*" (page 27, and Appendix F, pages 2 and 3).

Public Participation

On December 27, 2016, the MS TIG published a Draft RP/EA, and the public was encouraged to review and comment on the Draft RP/EA during a forty-five (45) day comment period, which closed on February 10, 2017. A Notification of Availability for the Draft RP/EA was published in the Federal Register, the restore.ms website, and the Trustee Council website. Comments were accepted via an online public comment portal, email delivery, and U.S. Postal Service mail. As a result, the MS TIG Trustees received submissions from private citizens; state and local agencies; and non-governmental organizations. The MS TIG reviewed the comments and considered them prior to finalization of the RP/EA. Section 6 of the RP/EA provides further detail on the public comment process including a summary of all public comments received on the Draft RP/EA and the MS TIG's responses.

Adoption of the RP/EA NEPA analysis by Federal Agency members of MS TIG

Each federal agency on the MS TIG must make its own independent evaluation of the NEPA analysis in support of its MS TIG decision-making responsibilities. In accordance with 40 CFR 1506.3(a) and the SOP (Appendix F, Page 4), each of the federal agencies participating on the MS TIG has reviewed the RP/EA, found that it meets the standards set forth in its own NEPA implementing procedures, and accordingly has adopted the RP/EA NEPA analysis.

Description of Proposed Actions and Alternatives

The CEQ NEPA regulations require the decision maker to consider the environmental effects of the Proposed Action and a reasonable range of alternatives, including the No Action Alternative (40 CFR § 1502.14). The RP/EA analyzes six alternatives (three of which are preferred by the MS TIG) as well as a No Action alternative. The MS TIG has determined that implementation of the preferred alternatives and projects associated with those alternatives (Proposed Action) will result in more efficient restoration benefits than the other action alternatives or the No Action Alternative.

Table: SUMMARY OF THE ALTERNATIVES CONSIDERED IN THE RP/EA

Restoration Goals	Restore and Conserve Habitat Replenish and Protect Living Coastal and Marine Resources	Restore Water Quality
Description of the Alternatives	Alternative A **(Preferred)**: Graveline Bay Land Acquisition and Management Project This project would include the acquisition of up to 1,410 acres of land from willing sellers, as well as preservation and habitat enhancement of up to 2,185 acres to partially restore injuries to WCNH and Birds in Mississippi. Habitat to be acquired includes estuarine marsh, shoreline (beach), and other coastal riparian habitats, some of which provide foraging, loafing and nesting for bird species that were injured in the DWH oil spill. Habitat restoration measures and management activities could include vehicular access restriction on Graveline beach; chemical treatment of invasive species; mechanical treatment; prescribed fire; debris removal; and road removal/repair and culvert placement.	Alternative A **(Preferred)**: Upper Pascagoula River Water Quality Enhancement Project The project would improve water quality through the development and implementation of conservation plans and practices to reduce nutrient and sediment runoff into coastal waters. Conservation practices, especially those systems that avoid, control, and trap nutrient and sediment losses, would be implemented on cropland, pasture/grassland, forestland, associated agriculture lands, and riparian areas within farmsteads in the Chunky-Okatibbee watersheds. This project would provide outreach and technical assistance to voluntary participants (landowners) within a 20,000-acre area.
	Alternative B: Grand Bay Land Acquisition This project would include the acquisition of up to 8,000 acres of land from willing sellers at appraised value within the boundaries of the Grand Bay National Wildlife Refuge (NWR), the Grand Bay National Estuarine Research Reserve (NERR), and the Savanna Coastal Preserve (CP).	Alternative B: Pascagoula River Basin Riparian Buffer Maintenance Plan The project would improve water quality through the development and implementation of conservation plans and practices in riparian areas, prioritizing opportunities that are within one mile of tributaries. Conservation practices would be implemented in riparian areas within forestland and associated agriculture lands and forests on farmsteads in the Chunky-Okatibbee watersheds in Mississippi. This project would provide outreach and technical assistance to voluntary participants (landowners) within a 20,000-acre area.
	Alternative C: Grand Bay Habitat Management This project would include habitat management on up to 17,500 acres of current public lands within the NWR, NERR, and CP boundaries.	No Action Alternative (No Action) Under the No Action Alternative, the MS TIG would not pursue Nutrient Reduction (Nonpoint Source) Restoration Type projects at this time, and would instead allow natural recovery processes to occur, which could result in one of four outcomes

		for injured resources: 1) gradual recovery, 2) partial recovery, 3) no recovery, or 4) further deterioration.
	Alternative D **(Preferred)**: Grand Bay Land Acquisition and Habitat Management Project This project would include both habitat acquisition (up to 8,000 acres) and restoration (up to 17,500 acres) to partially restore injuries to WCNH and Birds in Mississippi. Target habitats would include coastal marsh, beach, freshwater marsh, savannas and flatwoods, and forested freshwater scrub-shrub. Habitat restoration measures and management activities could include chemical treatment, mechanical treatment, and prescribed fire.	
	No Action Alternative (No Action) Under the No Action Alternative, the MS TIG would not pursue WCNH and Birds Restoration Type projects at this time, and would instead allow natural recovery processes to occur, which could result in one of four outcomes for injured resources: 1) gradual recovery, 2) partial recovery, 3) no recovery, or 4) further deterioration.	

Analysis Summary

Section 3.0 of the RP/EA provides the analysis needed to assess the significance of the impacts of the proposed action.

The RP/EA evaluated both beneficial and adverse impacts of the Proposed Action, which is to implement the three preferred alternatives and associated projects described and analyzed in the RP/EA. Project implementation will provide many benefits to the environment; however, because there is potential to adversely affect one type of resource while improving the condition of another resource, there may at times be minor to moderate site-specific adverse environmental effects. Future NEPA evaluations would be conducted by the Implementing Trustees or on behalf of the Implementing Trustees by their project partners by completing an Environmental Evaluation (Appendix A of the RP/EA) that would document whether impacts are at or below maximum adverse impacts described in the RP/EA. The MS TIG does not propose to take actions that would result in any significant adverse direct, indirect, or cumulative impacts on the environment.

- The Proposed Action is not expected to result in significant adverse effects on public health or safety. The restoration measures/management activities will provide long-term beneficial impacts to improve natural ecosystem functions, and best practices will be implemented on a site-specific basis to mitigate the potential for adverse effects to occur to public health and safety during implementation.

- The Proposed Action will have no significant adverse impacts to unique characteristics of the geographic areas. The Proposed Action is not expected to have any significant adverse effects on wetlands, floodplains, municipal water sources, ecologically critical areas, wild and scenic river corridors, park lands, wilderness, wilderness research areas, research natural areas, inventoried roadless areas, national recreation areas, or prime farmlands, particularly on a regional basis. The purpose of the Proposed Action is to improve the condition of natural resources damaged by the DWH oil spill.

- The effects of the Proposed Action on the quality of the human environment are not controversial. The Proposed Action is supported by the public. No public comments indicated opposition to the Proposed Action.

- There are no highly uncertain, unique or unknown risks associated with the Proposed Action. The land acquisition, habitat restoration and management activities, and conservation practices are successful, well-established, and commonly used practices for habitat restoration and land conservation.

- The Proposed Action neither establishes a precedent for future MS TIG actions with significant effects nor represents a decision in principle about a future consideration. Future MS TIG actions will be determined through separate planning processes.

- The Proposed Action will not result in significant adverse cumulative impacts. As discussed in the RP/EA, the Proposed Action is intended to benefit natural resources. Though some minor, primarily short-term adverse effects may occur in some locations, the cumulative effects of these actions on the quality of the human environment are not expected to be regionally significant, particularly when focusing on the significant adverse impacts that NEPA is intended to help decision makers avoid, minimize, or mitigate. As the RP/EA also indicates, to the extent there are indications that site-specific projects may have the potential to result in significant adverse effects to the quality of the human environment, an EA or EIS may be prepared separately from the RP/EA.

- The Proposed Action is not expected to adversely affect districts, sites, highways, structures, or objects listed in or eligible for listing in the National Register of Historic Places and is not expected to cause loss or destruction of significant scientific, cultural, or historical resources. The Proposed Action will be implemented in accordance with all applicable laws and regulations concerning the protection of cultural and historic resources.

- The Proposed Action is not expected to have a significant impact on endangered or threatened species, or their critical habitat as defined under the Endangered Species Act of 1973, and in fact is expected to benefit species. Consultations with U.S. Fish and Wildlife Service and National Marine Fisheries Service have been completed and the MS TIG received concurrence that the Proposed Action will either (1) have no effect or, (2) with the use of conservation measures identified in the consultations and the RP/EA, may affect but is not likely to adversely affect threatened or endangered species or designated critical habitat.

- Based on information in the RP/EA, the Proposed Action is not expected to threaten a violation of Federal, state, or local laws, or requirements imposed for environmental protection. Furthermore, the MS TIG will complete an Environmental Evaluation Worksheet to ensure NEPA and regulatory compliance, and to document whether impacts are at or below maximum adverse impacts described in the RP/EA.2

- The Proposed Action will not adversely affect stocks of marine mammals as defined in the Marine Mammal Protection Act. This Proposed Action does not require authorization under MMPA.

- The Proposed Action will not adversely affect fish species managed under the Magnuson-Stevens Fishery Conservation and Management Act. No in-water work will be conducted as part of the Graveline Bay Land Acquisition and Management project or the Grand Bay Land Acquisition and Habitat Management project. Some in-stream conservation practices will be implemented in the Upper Pascagoula River Water Quality Enhancement project, however, no federally managed fish species occur in those areas.

- The Proposed Action will not adversely affect essential fish habitat as defined under the Magnuson-Stevens Fishery Conservation and Management Act. Consultation with NOAA NMFS has been completed and NMFS concurred that the Proposed Action will not affect essential fish habitat.

- The Proposed Action will not adversely affect vulnerable marine or coastal ecosystems, including but not limited to deep coral ecosystems, because no coastal in-water work will be conducted.

- The Proposed Action is not expected to adversely affect biodiversity or ecosystem functioning (e.g., benthic productivity, predator-prey relationships, etc.). The Graveline Bay Land Acquisition and Management project and the Grand Bay Land Acquisition and Habitat Management project are expected to provide long-term benefits by increasing diversity in flora and fauna, and the Upper Pascagoula River Water Quality Enhancement project is expected to improve the water quality of the Pascagoula River, thereby benefiting biodiversity and ecosystem functioning.

- The Proposed Action is not expected to result in the introduction or spread of a nonindigenous species. Project purposes include management of invasive species and best practices are included in the RP/EA to minimize the risk of the introduction or spread of nonindigenous species. All three projects include provisions for invasive species management.

[2] Described in the RP/EA Section 3.1.2 and 3.7.2

Approach to NEPA Review of Restoration and Management Activities

The MS TIG outlined a process in Sections 3.1.2 and 3.7.2 of the RP/EA that ensures site-specific adverse environmental impacts will continue to be avoided or minimized in the future as restoration measures and management activities and conservation practices are planned for specific parcels. Once these measures are developed, an Environmental Evaluation Worksheet will be completed to document whether impacts are at or below maximum adverse impacts described in the RP/EA. If, upon completion of the Environmental Evaluation Worksheet, impacts are expected to exceed those described in the RP/EA and summarized in this FONSI, the MS TIG will evaluate a plan of action to comply with NEPA and all other applicable environmental compliance requirements.

DETERMINATION

In view of the information presented in this document and the analysis contained in the RP/EA, it is hereby determined that implementation of the Restoration Plan will not significantly impact the quality of the human environment as described above. Therefore, an EIS will not be prepared.

[Signatures are on the following pages.]

Date: __6/16/17_______

Signature: ____________________________

Kevin D. Reynolds
Deepwater Horizon NRDAR Case Manager, U.S. Department of the Interior

Date: 16 JUN 2017

Signature:

David G. Westerholm
Director, Office of Response and Restoration
National Ocean Service
National Oceanic and Atmospheric Administration

Date: 6/16/17

Signature:

for Patricia A. Montanio
Director, Office of Habitat Conservation
National Marine Fisheries Service
National Oceanic and Atmospheric Administration

Date: __6/16/17_______

Signature: Homer L. Wilkes
____
Homer Wilkes
Principal Representative for the U.S. Department of Agriculture

Date: __6/16/17_______

Signature: ____________________________
Mary Kay Lynch
Alternate to Principal Representative, U.S. Environmental Protection Agency