DEEPWATER HORIZON OIL SPILL

FLORIDA TRUSTEE IMPLEMENTATION GROUP

DRAFT RESTORATION PLAN 1 AND ENVIRONMENTAL ASSESSMENT: HABITAT PROJECTS ON FEDERALLY MANAGED LANDS; NUTRIENT REDUCTION; WATER QUALITY; AND PROVIDE AND ENHANCE RECREATIONAL OPPORTUNITIES

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Executive Summary

In the spring of 2010, the *Deepwater Horizon* (DWH) mobile drilling unit exploded resulting in loss of life and a massive release of oil and natural gas from the BP Exploration and Production, Inc. (BP) Macondo well. Initial efforts to cap the well were unsuccessful resulting in 87 days of continuous discharge into the northern Gulf of Mexico, totaling approximately 3.19 million barrels (134 million gallons) of oil (U.S. v. BP et al., 2015). Oil spread from the deep ocean to the surface and nearshore environment from Texas to Florida, coming into contact and injuring a diverse set of natural resources. Extensive response actions, including cleanup activities and actions to prevent the oil from reaching sensitive resources, were undertaken; however, many of these response actions had collateral impacts on the environment and natural resource services. The oil and other substances released from the well, in combination with the extensive response actions, together make up the DWH oil spill.

Pursuant to the Oil Pollution Act (OPA), Title 33 United States Code §§ 2701 *et seq*., and the laws of individual affected states, federal agencies, state agencies, Indian tribes, and foreign governments act as trustees on behalf of the public to assess injuries to natural resources and their services[1] that result from an oil spill incident, and to plan for restoration to compensate for those injuries. Under the authority of OPA, the DWH Trustees conducted a natural resource damage assessment (NRDA) to assess the impacts of the DWH oil spill on natural resources and their services and prepared the 2016 *Deepwater Horizon* Oil Spill: Final Programmatic Damage Assessment and Restoration Plan/Programmatic Environmental Impact Statement (PDARP/PEIS)[2] which outlines the type of restoration needed to compensate the public for the diverse suite of injuries that occurred at both regional and local scales as well as the funding allocations to each Restoration Type.

In the PDARP/PEIS, the DWH Trustees identified the need for a comprehensive restoration plan at a programmatic level to guide and direct an ecosystem-level restoration effort, based on four Restoration Goals: Restore and Conserve Habitat; Restore Water Quality; Replenish and Protect Living Coastal and Marine Resources; and Provide and Enhance Recreational Opportunities. In addition, a fifth Restoration Goal, addressing monitoring and adaptive management and administrative oversight for restoration implementation, supports the Restoration Types under the Restoration Goals and informs overall decision-making (Figure 5.4-1 in the PDARP/PEIS).

Draft Restoration Plan 1 and Environmental Assessment

The Florida Trustee Implementation Group (FL TIG) is responsible for restoring natural resources and their services within the Florida Restoration Area that were injured by the DWH oil spill. The FL TIG

[1] Services (or natural resource services) are defined as the functions performed by a natural resource for the benefit of another natural resource and/or the public (15 Code of Federal Regulations § 990.30).
[2] The PDARP/PEIS can be found at www.gulfspillrestoration.noaa.gov/restoration-planning/gulf-plan/.

includes two state Trustee agencies and four federal Trustee agencies: the Florida Department of Environmental Protection; the Florida Fish and Wildlife Conservation Commission; the United States Department of Commerce, represented by the National Oceanic and Atmospheric Administration; the United States Department of the Interior, represented by the United States Fish and Wildlife Service, National Park Service, and Bureau of Land Management; the United States Department of Agriculture; and the United States Environmental Protection Agency.

The FL TIG has prepared this Draft Restoration Plan and Environmental Assessment (RP/EA) to address, in part, injury to natural resources in the Florida Restoration Area as a result of the DWH oil spill. The purpose of restoration, as discussed in this document and detailed in the PDARP/PEIS, is to make the environment and the public whole by implementing restoration actions that return injured natural resources and their services to baseline conditions and compensate for interim losses, in accordance with OPA and associated OPA NRDA regulations. This RP/EA includes a description and evaluation of 32 restoration projects, also called restoration alternatives,[3] consistent with four of the Restoration Types from the PDARP/PEIS, as follows:

- Habitat Projects on Federally Managed Lands: six alternatives;
- Nutrient Reduction (Nonpoint Source; hereafter referred to as Nutrient Reduction): three alternatives;
- Water Quality (e.g., Stormwater Treatments, Hydrologic Restoration, Reduction of Sedimentation, etc.; hereafter referred to as Water Quality): 12 alternatives; and
- Provide and Enhance Recreational Opportunities: 11 alternatives.

Table ES-1 lists the reasonable range of alternatives, noting those that are preferred for funding by the FL TIG at this time.

Table ES-1 List of the reasonable range of alternatives proposed in this RP/EA, by Restoration Type and location (west to east)

Reasonable Range of Restoration Alternatives		Estimated Project Costs
Restoration Type: Habitat Projects on Federally Managed Lands (FM)[1]		
FM1. Gulf Islands National Seashore (Florida) Beneficial Use of Dredged Materials at Perdido Pass	-	$4,783,847
FM2. Gulf Islands National Seashore (Florida) Night Sky Restoration (P&D)[2]	Preferred[3]	$432,093
FM3. Gulf Islands National Seashore (Florida) Night Sky Restoration (Implementation)	-	$7,669,834
FM4. Gulf Islands National Seashore (Florida) Beach and Dune Habitat Protection	Preferred	$853,821
FM5. Gulf Islands National Seashore (Florida) Invasive Plant Removal	Preferred	$875,765
FM6. St. Vincent National Wildlife Refuge Predator Control	Preferred	$ 580,772

[3] The terms "project" and "alternative" are used interchangeably throughout this RP/EA.

Reasonable Range of Restoration Alternatives		Estimated Project Costs
Restoration Type: Nutrient Reduction (NR)[1]		
NR1. Pensacola Bay and Perdido River Watersheds - Nutrient Reduction	Preferred	$2,100,000
NR2. Apalachicola Bay Watershed - Nutrient Reduction	-	$3,150,000
NR3. Lower Suwannee River Watershed - Nutrient Reduction	Preferred	$3,150,000
Restoration Type: Water Quality (WQ)[1]		
WQ1. Carpenter Creek Headwaters Water Quality Improvements	Preferred	$1,689,900
WQ2. Pensacola Beach Reclaimed Water System Expansion	Preferred	$4,683,404
WQ3. Rattlesnake Bluff Road and Riverbank Restoration	Preferred	$3,149,091
WQ4. Pensacola Bay Unpaved Roads Initiative (P&D)	Preferred	$705,473
WQ5. Alligator Lake Coastal Dune Lake Hydrologic Restoration	Preferred	$1,382,400
WQ6. Grand Lagoon Regional Stormwater Facility	-	$3,210,910
WQ7. St. Andrew Bay Unpaved Roads Initiative (P&D)	-	$705,473
WQ8. City of Port St. Joe Stormwater Improvements	Preferred	$961,000
WQ9. MK Ranch Hydrologic Restoration	-	$27,484,932
WQ10. City of Carrabelle's Lighthouse Estates: Septic Tank Abatement - Phase II	Preferred	$3,237,986
WQ11. Lower Suwannee National Wildlife Refuge Hydrologic Restoration (P&D)	Preferred	$500,000
WQ12. Lower Charlotte Harbor Flatwoods Hydrologic Restoration Initiative, Yucca Pens Unit (P&D)	Preferred	$636,500
Restoration Type: Provide and Enhance Recreational Opportunities (REC)[1]		
REC1. Perdido Bay Sunset Islands Snorkeling Trail	-	$840,000
REC2. Tarkiln Bayou Preserve State Park Improvements	-	$2,719,670
REC3. Perdido River and Bay Paddle Trail	Preferred	$1,165,488
REC4. Carpenter Creek Headwaters Park Amenities	Preferred	$446,080
REC5. Gulf Islands National Seashore (Florida) Rehabilitation of Okaloosa Unit Recreational Facilities	Preferred	$3,201,383
REC6. Joe's Bayou Recreation Area Improvements	Preferred	$12,202,891
REC7. Topsail Hill Preserve State Park Improvements	Preferred	$3,926,811
REC8. Camp Helen State Park Improvements	Preferred	$3,326,027
REC9. St. Andrews State Park Improvements	Preferred	$10,875,855
REC10. T.H. Stone Memorial St. Joseph Peninsula State Park Improvements	Preferred	$977,945
REC11. St. Marks National Wildlife Refuge Coastal Trail Connection, Spring Creek to Port Leon	Preferred	$1,200,000
Subtotal for Preferred Alternatives		**$62,260,685**

[1] FM = Habitat Projects on Federally Managed Lands; NR = Nutrient Reduction; WQ = Water Quality; REC = Provide and Enhance Recreational Opportunities. [2] P&D indicates projects that include planning, feasibility, design, engineering, and/or permitting activities only (i.e., not actions related to implementation or construction). [3] Preferred indicates projects that are preferred for funding by the FL TIG at this time.

Public Participation in the Draft Restoration Plan 1 and Environmental Assessment

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

The public is encouraged to review and comment on this RP/EA. Following public notice, the RP/EA will be available to the public for a 30-day comment period. The deadline for submitting written comments on the RP/EA is specified in the public notice published in the *Federal Register* and on the DWH Trustee website. Comments on the RP/EA can be submitted, during the comment period, by one of following methods:

- **Online**: http://www.gulfspillrestoration.noaa.gov/restoration-areas/florida
- **By mail, hard copy addressed to**: U.S. Fish and Wildlife Service, P.O. Box 49567, Atlanta, GA 30345
- **In person at the public meeting**. See section 1.9 for details on the meeting.
- **During the pubic webinar**. See section 1.9 for details on the webinar.

In order to be considered, mailed comments must be postmarked no later than 30 days after the start of the comment period (i.e., on or before the comment deadline specified in the *Federal Register* and on the DWH Trustee website).

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

List of Abbreviations and Acronyms

AFB	Air Force Base
ARWEA	Apalachicola River Wildlife and Environmental Area
AWT	Advanced wastewater treatment
bls	below land surface
BMAP	Basin Management Action Plan
BMP	best management practice
BP	BP Exploration and Production, Inc.
CAA	Clean Air Act
CAAA	Clean Air Act Amendments
CBA	Choctawhatchee Basin Alliance
CCP	Comprehensive Conservation Plan
CMP	Conservation Management Plan
CEQ	Council on Environmental Quality
CFR	Code of Federal Regulations
CO	carbon monoxide
CO_2	carbon dioxide
CP	conservation practice standard(s)
DEP	Florida Department of Environmental Protection
DOE	U.S. Department of Energy
DOI	U.S. Department of the Interior
DWH	*Deepwater Horizon*
ECUA	Emerald Coast Utilities Authority
EFH	Essential Fish Habitat
EPA	U.S. Environmental Protection Agency
ERP	Environmental Resource Permit
ESA	Endangered Species Act of 1973
FAC	Florida Administrative Code
FDACS	Florida Department of Agriculture and Consumer Services
FEMA	Federal Emergency Management Plan
FL TIG	Florida Trustee Implementation Group
FM	Habitat Projects on Federally Managed Lands
FMSF	Florida Master Site File
FNAI	Florida Natural Areas Inventory
FNST	Florida National Scenic Trail
FR	Federal Register
FWC	Florida Fish and Wildlife Conservation Commission
GEBF	Gulf Environmental Benefit Fund
GHG	greenhouse gas
GIS	Geographic Information System
GUIS	Gulf Islands National Seashore
HUC	Hydrologic Unit Code

IPaC	U.S. Fish and Wildlife Service Information for Planning and Consultation
Magnuson-Stevens Act	Magnuson-Stevens Fishery Conservation and Management Act of 1976
MAM	monitoring and adaptive management
MGD	Million gallons per day
MMPA	Marine Mammal Protection Act of 1972
NAAQS	National Ambient Air Quality Standards
NEPA	National Environmental Policy Act of 1970
NFWF	National Fish and Wildlife Foundation
NHPA	National Historic Preservation Act of 1966
NMFS	National Marine Fisheries Service
NO_2	nitrogen dioxide
NO_x	nitrogen oxides
NOA	Notice of Availability
NOAA	National Oceanic and Atmospheric Administration
NOI	Notice of Intent (to conduct restoration planning)
NPS	National Park Service
NR	Nutrient Reduction
NRCS	U.S. Department of Agriculture National Resources Conservation Service
NRDA	Natural Resource Damage Assessment
NRHP	National Register of Historic Places
NSNSD	Natural Sounds and Night Skies Division
NWFWMD	Northwest Florida Water Management District
NWR	National Wildlife Refuge
O_3	ozone
OFW	Outstanding Florida Water
OPA	Oil Pollution Act of 1990
Pb	lead
P&D	Planning and design, indicates projects that include planning, feasibility, design, engineering, and/or permitting activities only (i.e., not actions related to implementation or construction)
PDARP/PEIS	Final Programmatic Damage Assessment and Restoration Plan and Final Programmatic Environmental Impact Statement
Phase III RP/PEIS	*Deepwater Horizon* Oil Spill: Programmatic and Phase III Early Restoration Plan and Early Restoration Programmatic Environmental Impact Statement
REC	Provide and Enhance Recreational Opportunities
RESTORE	Resources and Ecosystems Sustainability, Tourist Opportunities, and Revived Economies of the Gulf Coast States
ROD	Record of Decision
RP/EA	Restoration Plan/Environmental Assessment
SABW	St. Andrew Bay Watch
SAV	submerged aquatic vegetation
SFWMD	South Florida Water Management District
SHPO	State Historic Preservation Office
SO_2	sulfur dioxide
SRI	Sediment Risk Index
SRWMD	Suwannee River Water Management District

STCM	Storage Tank and Petroleum Contamination Monitoring
SWIM	Surface Water Improvement and Management
TAP	Treatment Action Plan
TMDL	Total Maximum Daily Loads
TNC	The Nature Conservancy
Trustees	*Deepwater Horizon* oil spill natural resource damage assessment trustee council
Trustee SOPs	*Deepwater Horizon* Trustee Council Standard Operating Procedures
UF	University of Florida
UF IFAS	University of Florida Institute of Food and Agricultural Sciences
USACE	U.S. Army Corps of Engineers
USDA	U.S. Department of Agriculture
USDA-APHIS-WS	U.S. Department of Agriculture Animal and Plant Health Inspection Service Wildlife Services
USFWS	U.S. Fish and Wildlife Service
UWF	University of West Florida
WMA	Wildlife Management Area
WQ	Water Quality
WWTF	Wastewater treatment facility

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Chapter 1 Introduction, Purpose and Need, and Public Participation

1.1 Introduction

The Florida Trustee Implementation Group (FL TIG) has prepared this Draft Restoration Plan and Environmental Assessment (RP/EA) as part of their responsibility to address injury to natural resources and their services in the Florida Restoration Area as a result of the 2010 *Deepwater Horizon* (DWH) oil spill. This RP/EA includes a description and evaluation of 32 restoration projects, also called restoration alternatives.[4] This RP/EA also includes an evaluation of a natural recovery alternative in accordance with the Oil Pollution Act (OPA) Natural Resource Damage Assessment (NRDA) regulations, and a no action alternative in accordance with the National Environmental Policy Act (NEPA).

The purpose of restoration, as discussed in this document and detailed in the 2016 *Deepwater Horizon* Oil Spill: Final Programmatic Damage Assessment and Restoration Plan/Programmatic Environmental Impact Statement (PDARP/PEIS),[5] is to make the environment and the public whole for injuries resulting from the DWH oil spill by implementing restoration actions that return injured natural resources and their services to baseline conditions and compensate for interim losses, in accordance with the Oil Pollution Act of 1990 (OPA) and associated natural resource damage assessment (NRDA) regulations.

1.2 Background and Summary of Settlement

On April 20, 2010, the DWH mobile drilling unit exploded, caught fire, and eventually sank in the Gulf of Mexico, resulting in a massive release of oil and natural gas from the British Petroleum Exploration and Production, Inc. (BP) Macondo well, causing loss of life and extensive natural resource injuries. Initial efforts to cap the well were unsuccessful, resulting in 87 days of continuous discharge into the northern Gulf of Mexico. Approximately 3.19 million barrels (134 million gallons) of oil were released into the ocean (U.S. v. BP et al., 2015). Oil spread from the deep ocean to the surface and nearshore environment from Texas to Florida, coming into contact with and injuring a diverse set of natural resources including deep-sea corals, fish and shellfish, wetlands, sandy beaches, birds, sea turtles, and other protected marine life. The DWH oil spill prevented people from fishing, going to the beach, and enjoying typical recreational activities along the Gulf of Mexico. Extensive response actions, including cleanup activities and actions to prevent the oil from reaching sensitive resources, were undertaken to try to reduce harm to people and the environment; however, many of these actions had collateral impacts on natural resources and their services. The oil and other substances released from the well, in combination with the response actions, together make up the DWH oil spill.

[4] The terms "project" and "alternative" are used interchangeably throughout this RP/EA.
[5] The PDARP/PEIS and ROD can be found at www.gulfspillrestoration.noaa.gov/restoration-planning/gulf-plan/.

On April 20, 2011, as part of the Early Restoration Framework Agreement, BP agreed to provide up to $1 billion toward Early Restoration projects in the Gulf of Mexico, representing a preliminary step toward the restoration of injured natural resources.[6] Early Restoration proceeded in five phases, resulting in 65 projects (totaling approximately $877 million) to partially address injuries to nearshore resources, birds, fish, sea turtles, federally managed lands, and recreational uses. Thirty-two of these projects (approximately $144.4 million) are being implemented within the Florida Restoration Area by the FL TIG.[7]

In February 2016, the DWH Trustee Council (Trustees) issued the PDARP/PEIS detailing a proposed plan to fund and implement restoration projects over the next 15 years. In March 2016, the Trustees published a Notice of Availability (NOA) of a Record of Decision (ROD) for the PDARP/PEIS. Based on the injury determination in the PDARP/PEIS, the ROD set forth the basis for the Trustees' decision to select Alternative A: Comprehensive Integrated Ecosystem Alternative. In April 2016, the United States (U.S.) District Court for the Eastern District of Louisiana entered a Consent Decree resolving civil claims by the Trustees against BP for the DWH oil spill.[8]

Under the Consent Decree among Defendant BP, the United States of America, and the states of Alabama, Florida, Louisiana, Mississippi, and Texas, BP agreed to pay a total of $8.1 billion in natural resource damages (which includes the $1 billion that BP previously committed to Early Restoration projects) over a 15-year period, and up to an additional $700 million for adaptive management or to address injuries to natural resources that are presently unknown but may come to light in the future. The settlement funds were allocated across seven Restoration Areas: the five Gulf states (Alabama, Florida, Louisiana, Mississippi, and Texas), Regionwide, and Open Ocean (U.S. Department of Justice 2016; Table 5.10-1 in the PDARP/PEIS).

The PDARP/PEIS describes the four programmatic Restoration Goals and underlying Restoration Types, and the funds allocated to each. In addition, a fifth Restoration Goal, for monitoring and adaptive management (MAM) and administrative oversight for restoration implementation, supports each Restoration Type and informs overall decision-making (Figure 5.4-1 in the PDARP/PEIS). In the Florida Restoration Area, $10,000,000 is allocated to MAM and $20,000,000 is allocated to administrative oversight and comprehensive planning. Table 1-1 provides the final settlement allocations for the four Restoration Goals and Restoration Types in the Florida Restoration Area.

[6] The Early Restoration Framework Agreement can be found at: www.gulfspillrestoration.noaa.gov/sites/default/files/wp-content/uploads/2011/05/framework-for-early-restoration-04212011.pdf

[7] Three Early Restoration projects that include activities in Florida, which total $18,352,220, are being implemented by other TIGs: the Improving Habitat Injured by Spill Response: Restoring the Night Sky project from Phase II Early Restoration is under the Regionwide TIG, and the Gulf Islands National Seashore Beach Enhancement project and Gulf Islands National Seashore Ferry project from Phase III Early Restoration are under the Open Ocean TIG.

[8] *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.)

Table 1-1 Florida restoration Area DWH settlement funds across the four programmatic Restoration Goals and underlying Restoration Types, including funds allocated to Early Restoration projects

Restoration Goal	Restoration Type	Total FL TIG Settlement Funds[9]	Funds Allocated To Early Restoration Projects
Restore and Conserve Habitat	Wetlands, Coastal and Nearshore Habitats	$5,000,000	$15,629,367
	Habitat Projects on Federally Managed Lands	$17,500,000	
Restore Water Quality	Nutrient Reduction	$35,000,000	--
	Water Quality	$300,000,000	--
Replenish and Protect Living Coastal and Marine Resources	Sea Turtles	$20,000,000	--
	Marine Mammals	$5,000,000	--
	Birds	$40,000,000	$2,835,000
	Oysters	$20,000,000	$5,370,596
Provide and Enhance Recreational Opportunities	Provide and Enhance Recreational Opportunities	$63,274,513	$120,543,167
Table 5.10-1 in the PDARP/PEIS provides the allocations to other Restoration Areas.			

1.3 DWH Trustee Council, Trustees, and TIGs

The Trustees are the State and Federal government entities authorized under OPA to act as trustees on behalf of the public to assess the natural resource injuries resulting from the DWH oil spill and develop and implement a restoration plan to compensate for those injuries. To work collaboratively, the Trustees organized the DWH Trustee Council comprising representatives of Florida, Alabama, Mississippi, Louisiana, Texas, U.S. Department of Commerce, represented by the National Oceanic and Atmospheric Administration (NOAA), U.S. Department of the Interior (DOI), U.S. Environmental Protection Agency (EPA), and U.S. Department of Agriculture (USDA).

The agencies representing the State of Florida are:

- Florida Department of Environmental Protection (FDEP); and
- Florida Fish and Wildlife Conservation Commission (FWC).

The PDARP/PEIS sets forth the post-settlement Trustee governance structure in which a TIG is assigned to each of the seven Restoration Areas. Each TIG is responsible for making the restoration decisions for the funding allocated to its Restoration Area. The TIGs comprise different Trustees depending on the Restoration Area they represent. This process and governance structure is described in Chapter 7 of the PDARP/PEIS. For the Florida Restoration Area, the FL TIG is comprised of two state Trustee agencies (FDEP and FWC) and four federal Trustee agencies (NOAA, DOI, EPA, and USDA).

[9] The total FL TIG settlement funds are $680,152,643, which include the funds by Restoration Goal, $10,000,000 for Monitoring and Adaptive Management, and $20,000,000 for Administrative Oversight and Comprehensive Planning.

1.4 Authorities and Regulations

1.4.1 Oil Pollution Act Compliance

As an oil pollution incident, the DWH oil spill is subject to the provisions of OPA. A primary goal of OPA is to make the environment and public whole for injuries to natural resources and their 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 damage.

Restoration activities under OPA are intended to return injured natural resources and services to their baseline condition. This can include primary restoration, which is any action including natural recovery that returns injured natural resources and their services to baseline, and compensatory restoration, actions to compensate the public for interim losses from the time of the incident until the time resources and services recover to baseline conditions (as defined in 15 CFR 990.53). To meet these goals, the restoration activities must produce benefits that are related to or have a nexus (connection) to natural resource injuries and service losses resulting from the spill.

In this RP/EA, the FL TIG identified a reasonable range of alternatives to partially address DWH-caused injuries to the following Restoration Types: Habitat Projects on Federally Managed Lands, Nutrient Reduction, Water Quality, and Provide and Enhance Recreational Opportunities. This RP/EA evaluates the reasonable range of alternatives under applicable OPA criteria and identifies a subset of alternatives that are preferred by the FL TIG for implementation.

1.4.2 National Environmental Policy Act Compliance

Federal Trustees must also comply with the National Environmental Policy Act of 1969 (NEPA) and the Council on Environmental Quality's (CEQ) NEPA implementing regulations, 40 Code of Federal Regulations (CFR) Parts 1500-1508, when proposing OPA NRDA 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.

Lead and Cooperating Agencies

CEQ NEPA implementing regulations 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)). DOI serves as the lead federal agency responsible for NEPA compliance for this RP/EA, ensuring its compliance with the CEQ's NEPA implementing regulations and DOI NEPA implementing procedures (43 CFR 46). The other FL TIG Trustees are participating as cooperating agencies 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 (Trustee SOPs; and Appendix F).[10]

Intent to Adopt the RP/EA NEPA Analysis by Cooperating Agencies

Each federal cooperating agency on the FL TIG intends to adopt the NEPA analysis in this RP/EA. In accordance with 40 CFR 1506.3(a), each of the three federal cooperating agencies participating on the FL TIG (EPA, USDA, and NOAA) will review this RP/EA for adequacy in meeting the standards set forth in its own NEPA implementing procedures. Each agency will then decide whether to adopt the analysis to inform its own federal decision-making and fulfill its responsibilities under NEPA. Adoption of the EA would be completed via signature on the relevant NEPA decision document. 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.

Incorporation by Reference

The FL TIG relies on incorporation by reference of existing NEPA analyses, management plans, studies or other relevant material (40 CFR 1502.21), adoption of existing NEPA analyses (40 CFR 1506.3) and tiering from the PDARP/PEIS (40 CFR 1502.20), where applicable, in the analysis of impacts in this RP/EA. The goal is to reduce redundancy, focus on significant issues, and show the interconnection of the alternatives with existing programs and regional efforts to address resource issues at an ecosystem level. All material incorporated, adopted, or which is otherwise used to support the NEPA analysis, is publicly available. Additional site-specific NEPA analysis is included where necessary (Chapter 4 of this RP/EA).

1.5 DWH Trustee Council Standard Operating Procedures

The Trustees developed the Trustee SOPs to govern the administration, implementation, and long-term management of restoration under the PDARP/PEIS. The Trustee SOPs, in addition to the PDARP/PEIS, help to guide DWH restoration planning; document the overall structure, roles, and decision-making responsibilities of the Trustees; and provide the common procedures to be used by all TIGs. The Trustee SOPs address, among other issues, the following topics: decision-making and delegation of authority, funding, administrative procedures, project reporting, MAM, consultation opportunities among the Trustees, public participation, and the Administrative Record. The Trustee SOPs were developed and approved by consensus of the Trustees and may be amended as needed. The division of responsibilities among the Trustees and TIGs is summarized in Table 7.2-1 of the PDARP/PEIS.

1.6 Restoration Purpose and Need

The FL TIG has undertaken this restoration planning effort to meet the purpose of contributing to the compensation for and restoration of natural resources and their services injured in the Florida Restoration Area as a result of the DWH oil spill. This RP/EA is consistent with the PDARP/PEIS, which

[10] The Trustee SOPs are available at: www.gulfspillrestoration.noaa.gov/sites/default/files/wp-content/uploads/DWH-SOPs.pdf

identified extensive and complex injuries to natural resources and their services across the Gulf of Mexico, as well as a need and plan for comprehensive restoration consistent with OPA. This RP/EA falls within the scope of the purpose and need identified in the PDARP/PEIS. As described in Section 5.3 of the PDARP/PEIS, the five Restoration Goals (Table 1-1) work independently and together to benefit injured resources and services. The proposed restoration alternatives in this RP/EA address three of the four programmatic Restoration Goals: (1) Restore and Conserve Habitat, (2) Restore Water Quality, and (3) Provide and Enhance Recreational Opportunities. Additional information about the purpose and need for DWH NRDA restoration can be found in Section 5.3.2 of the PDARP/PEIS.

1.7 Proposed Action

The FL TIG proposes to undertake the restoration alternatives identified as preferred in this RP/EA to provide compensatory restoration towards meeting three of the four programmatic Restoration Goals identified in the PDARP/PEIS (listed above in Section 1.6), and the goals consistent with the following Restoration Types: Habitat on Federally Managed Lands (FM), Nutrient Reduction (NR), Water Quality (WQ), and Provide and Enhance Recreational Opportunities (REC).

Table 1-2 identifies the reasonable range of alternatives evaluated in this RP/EA, including those identified as preferred by the FL TIG for implementation. After this RP/EA is finalized and alternatives are selected for implementation, the projects would be implemented over approximately the next three to five years. Figure 1-1 provides the approximate location of each restoration alternative. The FL TIG proposes to use $62,260,685 of the settlement funds allocated to the Florida Restoration Area in this RP/EA (i.e., the estimated cost of the preferred restoration alternatives).[11] This would leave a balance of $473,513,828 remaining for future restoration plans.

Table 1-2 List of the reasonable range of alternatives proposed in this RP/EA, by Restoration Type and location (west to east)

Restoration Type: Habitat Projects on Federally Managed Lands (FM)	
FM1. Gulf Islands National Seashore (Florida) Beneficial Use of Dredged Materials at Perdido Pass	-
FM2. Gulf Islands National Seashore (Florida) Night Sky Restoration (P&D)*	Preferred**
FM3. Gulf Islands National Seashore (Florida) Night Sky Restoration (Implementation)	-
FM4. Gulf Islands National Seashore (Florida) Beach and Dune Habitat Protection	Preferred
FM5. Gulf Islands National Seashore (Florida) Invasive Plant Removal	Preferred
FM6. St. Vincent National Wildlife Refuge Predator Control	Preferred
Restoration Type: Nutrient Reduction (NR)	
NR1. Pensacola Bay and Perdido River Watersheds - Nutrient Reduction	Preferred
NR2. Apalachicola Bay Watershed - Nutrient Reduction	-
NR3. Lower Suwannee River Watershed - Nutrient Reduction	Preferred
Restoration Type: Water Quality (WQ)	
WQ1. Carpenter Creek Headwaters Water Quality Improvements	Preferred

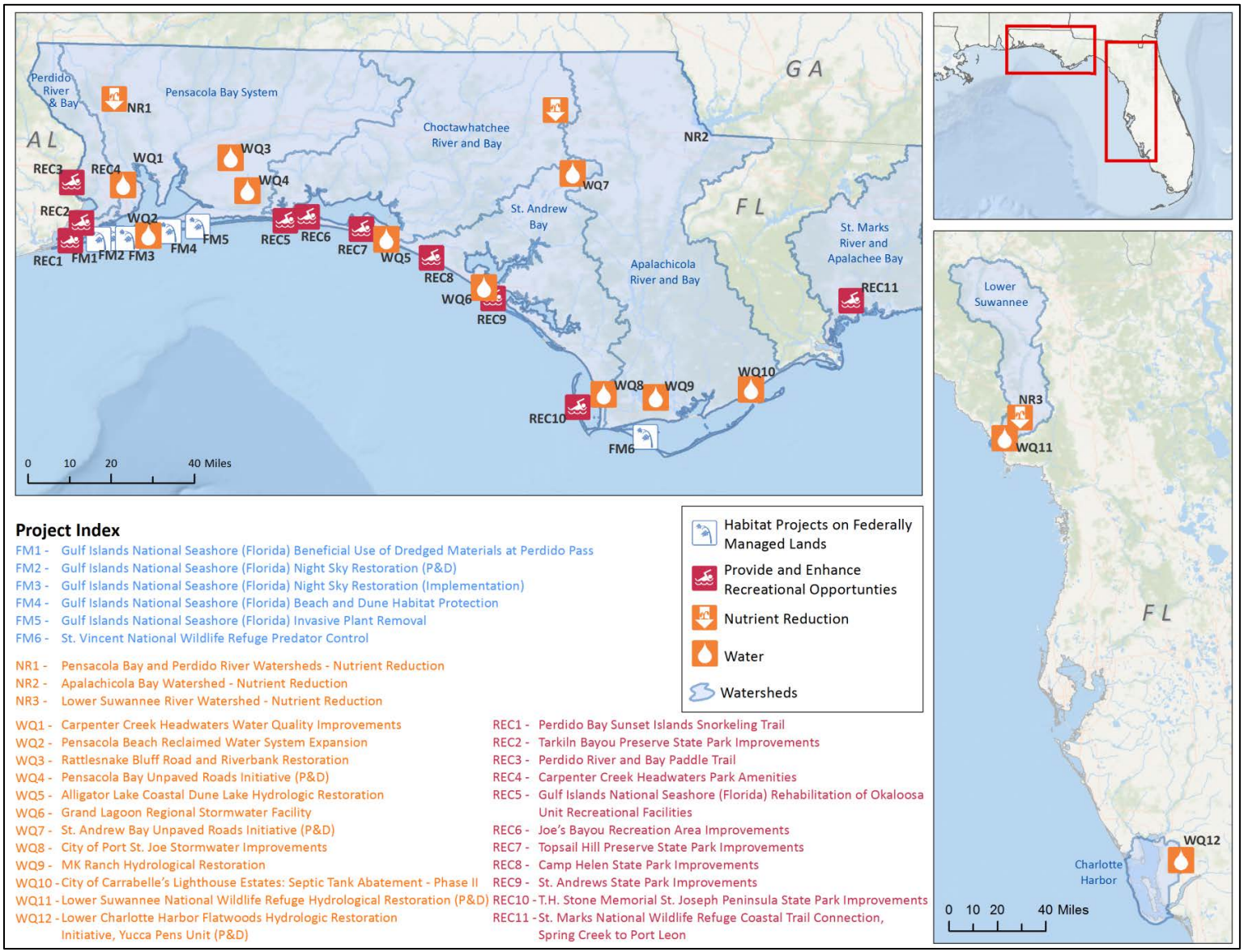
[11] Each alternative's estimated costs are provided in Chapter 2.

WQ2. Pensacola Beach Reclaimed Water System Expansion	Preferred
WQ3. Rattlesnake Bluff Road and Riverbank Restoration	Preferred
WQ4. Pensacola Bay Unpaved Roads Initiative (P&D)	Preferred
WQ5. Alligator Lake Coastal Dune Lake Hydrologic Restoration	Preferred
WQ6. Grand Lagoon Regional Stormwater Facility	-
WQ7. St. Andrew Bay Unpaved Roads Initiative (P&D)	-
WQ8. City of Port St. Joe Stormwater Improvements	Preferred
WQ9. MK Ranch Hydrologic Restoration	-
WQ10. City of Carrabelle's Lighthouse Estates: Septic Tank Abatement - Phase II	Preferred
WQ11. Lower Suwannee National Wildlife Refuge Hydrologic Restoration (P&D)	Preferred
WQ12. Lower Charlotte Harbor Flatwoods Hydrologic Restoration Initiative, Yucca Pens Unit (P&D)	Preferred
Restoration Type: Provide and Enhance Recreational Opportunities (REC)	
REC1. Perdido Bay Sunset Islands Snorkeling Trail	-
REC2. Tarkiln Bayou Preserve State Park Improvements	-
REC3. Perdido River and Bay Paddle Trail	Preferred
REC4. Carpenter Creek Headwaters Park Amenities	Preferred
REC5. Gulf Islands National Seashore (Florida) Rehabilitation of Okaloosa Unit Recreational Facilities	Preferred
REC6. Joe's Bayou Recreation Area Improvements	Preferred
REC7. Topsail Hill Preserve State Park Improvements	Preferred
REC8. Camp Helen State Park Improvements	Preferred
REC9. St. Andrews State Park Improvements	Preferred
REC10. T.H. Stone Memorial St. Joseph Peninsula State Park Improvements	Preferred
REC11. St. Marks National Wildlife Refuge Coastal Trail Connection, Spring Creek to Port Leon	Preferred

*P&D indicates projects that include planning, feasibility, design, engineering, and/or permitting activities only (i.e., not actions related to implementation or construction).

**Preferred indicates projects that are preferred for funding by the FL TIG at this time.

Figure 1-1 Approximate location of the reasonable range of alternatives proposed in this RP/EA



1.7.1 No Action

The Trustees are required under NEPA to evaluate a No Action alternative, which provides a benchmark enabling decision makers to compare the magnitude of environmental effects of the action alternatives (CEQ 1502.14(d)). Under this alternative, Early Restoration would be the only restoration implemented in the Florida Restoration Area (i.e., the preferred restoration alternatives identified in this RP/EA would not be implemented at this time).

The FL TIG has determined that the No Action alternative would not benefit injured natural resources. Without active NRDA restoration, resources would experience slower recovery, or some might not recover at all, and the public would not be compensated for losses to natural resources and their services during this recovery period ("interim" losses). The No Action alternative, inclusion of which is a NEPA requirement, provides a benchmark enabling decision makers to compare the magnitude of environmental effects of the action alternatives (CEQ 1502.14(d)). The No Action alternative is described and analyzed for each Restoration Type in Chapter 4 of this RP/EA.

1.7.2 Severability of Projects

Preferred restoration alternatives identified in this RP/EA are independent of each other and may be selected independently by the FL TIG. A decision not to select one or more of the alternatives does not affect the FL TIG's selection of any remaining alternatives. Projects not included in the reasonable range of alternatives, not identified as preferred at this time, or not selected for implementation can be considered for inclusion in future restoration plans developed by the FL TIG.

Further, the FL TIG may need to obtain permits (e.g., CWA Section 404 permits) for selected alternatives prior to implementation which could require additional environmental analyses.

1.8 Coordination with other Gulf Restoration Programs

As discussed in Section 1.5.6 of the PDARP/PEIS, coordination with other Gulf of Mexico restoration programs will promote successful implementation of restoration projects and optimize ecosystem recovery. The FL TIG is committed to coordinating with other DWH oil spill and Gulf of Mexico restoration programs (e.g., the Resources and Ecosystems Sustainability, Tourist Opportunities, and Revived Economies of the Gulf Coast States [RESTORE] programs and the National Fish and Wildlife Foundation's [NFWF] Gulf Environmental Benefit Fund [GEBF]) to maximize the overall ecosystem impact of restoration efforts and ensure effective use of funds by identifying synergies and reducing potential redundancies in project selection. This coordination will ensure that funds are allocated for critical restoration projects across the Gulf of Mexico, specifically within Florida. NRDA, RESTORE and GEBF projects currently funded within Florida are described on the DWH Trustee, the Florida DWH, the GEBF, and the RESTORE websites.[12] Restoration alternatives evaluated in this RP/EA that leverage funds from RESTORE or GEBF are identified within the project descriptions in Section 2.5.

[12] DWH Trustee: www.gulfspillrestoration.noaa.gov/restoration-areas/florida; Florida DWH: http://deepwaterhorizonflorida.com; GEBF: www.nfwf.org/gulf/Pages/GEBF-Florida.aspx; RESTORE: www.restorethegulf.gov/.

1.9 Public Participation

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

1.9.1 Public Involvement in this RP/EA

The FL TIG held a webinar to inform the public of restoration efforts in the Florida Restoration Area on August 23, 2016. The FL TIG requested project ideas on November 4, 2016 and issued a notice of initiation of restoration planning in Florida on September 29, 2017. After reviewing and evaluating project proposals (described in Chapter 2), the FL TIG developed this RP/EA to (1) inform the public about DWH NRDA restoration planning efforts in the Florida Restoration Area, (2) present analyses on the potential restoration benefits and environmental consequences of the restoration alternatives, and (3) seek public comment.

The public is encouraged to review and comment on this RP/EA. Following public notice, the RP/EA will be available to the public for a 30-day comment period. The deadline for submitting written comments on the RP/EA is specified in the public notice published in the *Federal Register* and on the DWH Trustee website. Comments on the RP/EA can be submitted, during the comment period, by one of following methods:

Online: http://www.gulfspillrestoration.noaa.gov/restoration-areas/florida

By mail, hard copy addressed to: U.S. Fish and Wildlife Service, P.O. Box 49567, Atlanta, GA 30345

In order to be considered, mailed comments must be postmarked no later than 30 days after the start of the comment period (i.e., on or before the comment deadline specified in the *Federal Register* and on the DWH Trustee website).

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

In person at the public meeting: The FL TIG will hold a public meeting to facilitate the public review and comment process. The public meeting will include a presentation of the draft RP/EA. There will be an open house from 5:30pm ET to 6:15pm ET, and the public meeting will be from 6:30pm ET to 8:30pm ET. Meeting location, date, and time are as follows:

- October 2, 2018, from 5:30pm to 8:30pm
  Florida Department of Environmental Protection
  Douglas Building Conference rooms A&B
  3900 Commonwealth Boulevard
  Tallahassee, Florida, 32399-3000

Public webinar: The FL TIG will also hold a public webinar to facilitate the public review and comment process. A weblink for the public webinar will be provided on the DWH Trustee website at http://www.gulfspillrestoration.noaa.gov/restoration-areas/florida. Webinar date and time are as follows:

- October 10, 2018, from 1:30pm to 4:00pm ET.

After the close of the comment period, the FL TIG will consider all comments received and revise the RP/EA, as appropriate. A summary of comments received and the FL TIG's responses where applicable, will be included in the Final RP/EA.

1.9.2 Administrative Record

The Trustees opened a publicly available Administrative Record for DWH oil spill NRDA, including restoration planning activities, concurrently with publication of the 2010 NOI (pursuant to 15 CFR § 990.45). DOI is the lead federal Trustee for maintaining the Administrative Record.[13]

Information about restoration project implementation is being provided to the public through the Administrative Record and other outreach efforts (Section 1.8 above), including the DWH Trustee and the Florida DWH websites.

1.10 Decisions to be Made

This RP/EA is intended to provide the public with the information necessary for meaningful review of the reasonable range of alternatives to address injuries to the following Restoration Types: Habitat Projects on Federally Managed Lands, Nutrient Reduction, Water Quality, and Provide and Enhance Recreational Opportunities (Table 1-2). This process is intended to guide the FL TIG's selection of preferred alternatives for implementation that best meet the purpose and need for this RP/EA (Section 1.6). Following appropriate OPA and NEPA regulatory procedures including public notice and comment on this RP/EA, and with public release of a Final RP/EA, the FL TIG intends to formally select one or more of the alternatives for implementation. Restoration alternatives not selected for implementation may continue to be considered for evaluation in future restoration plans.

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

1.11 Document Organization

- **Executive Summary**: Brief summary of the document.
- **Chapter 1 (Introduction, Purpose and Need, Proposed Action, and Public Participation)**: Introductory information and context for this document, including coordination with other restoration planning efforts;
- **Chapter 2 (Restoration Planning Process and Reasonable Range of Alternatives)**: Information on the NRDA restoration planning process, DWH oil spill injuries to resources addressed in this RP/EA, screening process of potential restoration projects to address those injuries, and a description of the reasonable range of alternatives considered in this RP/EA;
- **Chapter 3 (OPA Evaluation of Reasonable Range of Alternatives)**: Evaluation of the reasonable range of alternatives and the rationale for preferred alternatives;
- **Chapter 4 (Environmental Assessment)**: Description of the affected environment and the evaluation of environmental impacts of the reasonable range of alternatives, and compliance with other federal and state environmental protection laws that may apply to the reasonable range of alternatives;
- **Chapter 5 (Monitoring and Adaptive Management)**: General information on the MAM Restoration Goal and a description of the sections included in each project-level MAM plan;
- **Literature Cited; and**
- **Appendices**:
    - **Appendix A (List of Preparers, Reviewers, and Repositories)**: List of individuals who substantively contributed to the development of this RP/EA, and list of places where this RP/EA is available**;**
    - **Appendix B (Monitoring and Adaptive Management Plans)**: Draft MAM plans for preferred restoration alternatives that are planned for full implementation;
    - **Appendix C (Impact Intensity Definitions)**: Definitions of impact intensities (minor, moderate, major) from the PDARP/PEIS;
    - **Appendix D (County Demographic Information)**: General demographic information for each of the counties where the reasonable range of alternatives are located;
    - **Appendix E (Protected Species)**: List of protected species, federal and state status, and corresponding habitats;
    - **Appendix F (Environmental Evaluation Worksheet)**: An example of an Environmental Evaluation Worksheet.

Chapter 2 Restoration Planning Process and Reasonable Range of Alternatives

NRDA restoration under OPA is a process that includes evaluating injuries to natural resources and their services to determine the type and extent of restoration needed to address those injuries. Restoration activities need to produce benefits that are related to or have a nexus to the natural resources or their services impacted by an oil spill. Under the OPA NRDA regulations (15 CFR §990.54), trustees are to identify and evaluate a reasonable range of alternatives based on criteria outlined within that subsection. The OPA NRDA regulations provide criteria for use by trustees to evaluate projects designed to compensate the public for injuries caused by oil spills. In accordance with the OPA NRDA regulations (15 CFR §990.53), the FL TIG developed a screening process to identify a reasonable range of alternatives to be further evaluated in this plan.

This chapter describes the screening process used by the FL TIG to identify the reasonable range of alternatives in this RP/EA under the OPA NRDA regulations (15 CFR §990.53). The reasonable range of alternatives is consistent with the PDARP/PEIS (described in more detail in Chapter 1). This chapter summarizes the restoration decisions stated in the PDARP/PEIS and ROD[14], the relationship of the PDARP/PEIS to this RP/EA, injuries addressed, and the projects considered in the reasonable range of alternatives. The restoration planning process was conducted in accordance with OPA, NEPA, Consent Decree, Trustee SOPs, and the OPA NRDA and NEPA regulations.

2.1 PDARP/PEIS and Record of Decision

Given the potential magnitude and breadth of restoration for DWH oil spill injuries, the Trustees prepared a PDARP/PEIS under OPA and NEPA to analyze alternative Restoration Approaches and establish targeted goals specific to each Restoration Type to guide restoration planning. The PDARP/PEIS was issued on February 19, 2016 and detailed a programmatic plan to fund and implement restoration projects across the Gulf of Mexico over the next 15 years.

On March 29, 2016, in accordance with OPA and NEPA, the Trustees published a NOA of a ROD for the PDARP/PEIS in the Federal Register (81 FR 17438). Based on the 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 and its associated funding allocations. More information about Alternative A can be found in Sections 5.5 and 5.10 of the PDARP/PEIS. Summary information about the relationship between the PDARP/PEIS and this document can be found in Section 2.2 below.

[14] The PDARP/PEIS and ROD can be found at http://www.gulfspillrestoration.noaa.gov/restoration-planning/gulf-plan/.

2.2 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 restoration projects to be implemented by the TIGs (Section 5.10.4 and Chapter 7 of the PDARP/PEIS). As the PDARP/PEIS analysis shows, the injuries caused by the DWH oil spill cannot be fully described at the level of a single species, habitat type, or region. Therefore, there is a need for comprehensive restoration planning on a landscape and ecosystem scale that recognizes and strengthens existing connectivity among habitats, resources, and their services in the Gulf of Mexico, as illustrated in Alternative A. The Trustees prepared a PEIS to support the analysis of the environmental impacts of the reasonable range of alternatives, 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.

In the PDARP/PEIS, the Trustees developed a set of Restoration Goals and Types for inclusion in programmatic alternatives with an objective to seek a diverse set of projects providing benefits to a broad array of injured resources and their services. This process resulted in the inclusion of 13 Restoration Types across four programmatic Restoration Goals. In addition, a fifth Restoration Goal, for MAM and administrative oversight to support restoration implementation, supports each Restoration Type and informs overall decision-making (Figure 5.4-1 in the PDARP/PEIS). The Consent Decree and PDARP/PEIS allocated funding to the Florida Restoration Area for nine of the 13 Restoration Types and the MAM/administrative support Restoration Goal (see Table 1-1 and Table 2-1).

Table 2-1 Florida Restoration Area DWH settlement funds across the four programmatic Restoration Goals and underlying Restoration Types, including funds allocated to Early Restoration projects

Restoration Goal	Restoration Type	Total FL TIG Settlement Funds	Funds Allocated To Early Restoration Projects
Restore and Conserve Habitat	Wetlands, Coastal and Nearshore Habitats	$5,000,000	$15,629,367
	Habitat Projects on Federally Managed Lands	$17,500,000	
Restore Water Quality	Nutrient Reduction	$35,000,000	--
	Water Quality	$300,000,000	--
Replenish and Protect Living Coastal and Marine Resources	Sea Turtles	$20,000,000	--
	Marine Mammals	$5,000,000	--
	Birds	$40,000,000	$2,835,000
	Oysters	$20,000,000	$5,370,596
Provide and Enhance Recreational Opportunities	Provide and Enhance Recreational Opportunities	$63,274,513	$120,543,167
Table 5.10-1 in the PDARP/PEIS provides the allocations to other Restoration Areas.			

The reasonable range of alternatives included in this RP/EA (see Table 1-2) are consistent with the following Restoration Types: Habitat Projects on Federally Managed Lands (Section 5.5.3 of the

PDARP/PEIS), Nutrient Reduction (Section 5.5.4 of the PDARP/PEIS), Water Quality (Section 5.5.5 of the PDARP/PEIS), and Provide and Enhance Recreational Opportunities (Section 5.5.14 of the PDARP/PEIS).

2.3 Summary of Injuries Addressed in this RP/EA

Chapter 4 of the PDARP/PEIS summarizes the injury assessment, which documented the nature, degree, and extent of injuries from the DWH oil spill to both natural resources and their services. The reasonable range of alternatives identified in this RP/EA and in future FL TIG restoration plans are designed to address injuries in the Florida Restoration Area. This RP/EA identifies alternatives for the following Restoration Types: Habitat Projects on Federally Managed Lands, Nutrient Reduction, Water Quality, and Provide and Enhance Recreational Opportunities. This section summarizes the most relevant information from Chapter 4 of the PDARP/PEIS injury assessment and establishes the nexus for restoration planning for these Restoration Types.

2.3.1 Habitat Projects on Federally Managed Lands

The DWH oil spill and response activities caused extensive injuries to wetlands, coastal, and nearshore habitats on federally managed lands across the northern Gulf of Mexico. In Florida, the spill oiled 1,801 acres along 80 miles of federally managed beach shoreline (DOI and DOD lands in Florida, Table 4.6-18, page 4-397 in the PDARP/PEIS). Injuries from oiling and response-related activities occurred within St. Vincent National Wildlife Refuge (NWR) and the Florida units of the Gulf Islands National Seashore (GUIS), both of which have important sea turtle and avian nesting areas.

2.3.2 Nutrient Reduction and Water Quality

Water quality is intricately linked to the health and resilience of coastal and marine habitats and resources (e.g., Bricker et al. 2008). Due to the connectivity of the Gulf of Mexico ecosystem, actions related to reducing nutrients and improving water quality are expected to result in cascading ecological benefits, increasing the overall health and productivity of the Gulf, thereby restoring natural resources injured by the DWH oil spill. In the Florida Restoration Area, these actions exhibit strong ecological linkages to coastal habitats and communities, benefit recreational uses (Section 2.3.3), and contribute to the overall health and resiliency of Florida's coastal ecosystems. Specifically, improving water quality in coastal areas would reduce the occurrence of beach closures, restrictions on shellfish harvesting, and degradation of aquatic habitat quality that could compromise human health and recreational uses.

2.3.3 Provide and Enhance Recreational Opportunities

The Gulf of Mexico is a popular destination for a wide variety of recreational activities, drawing people regionally as well as nationally. These activities, including boating, fishing, and beach-going, depend on the environmental quality of the Gulf's natural resources and the ability to access them. The DWH oil spill resulted in losses to the public's use of natural resources for outdoor recreation from May 2010 through November 2011. The Trustees estimated that more than 16 million boating, fishing, and other

shoreline activity user-days[15] were lost across the five affected Gulf states. Total recreational use injuries attributable to the DWH oil spill are estimated at $693.2 million (with an uncertainty range of from $527.6 million to $858.9 million). Recreational use injury in the Florida Restoration Area has been partially addressed through Early Restoration projects, including the alternative selected in the Phase V.2 RP/SEA finalized in February 2018.[16]

2.4 Screening for a Reasonable Range of Alternatives for this RP/EA

In developing a reasonable range of alternatives for this RP/EA, the FL TIG reviewed the Restoration Goals and Types in the PDARP/PEIS. The FL TIG also considered other criteria identified in the PDARP/PEIS, including screening factors in the OPA NRDA regulations (15 CFR §990.54), input from the public, the current and future availability of funds under the DWH NRDA settlement payment schedule, as well as projects already funded or proposed to be funded by other TIGs or DWH funding sources (e.g., GEBF and RESTORE). A summary of the OPA evaluation criteria is provided in Section 3.1. The FL TIG's screening process is described in Sections 2.4.1 through 2.4.4.

2.4.1 Eligibility Screening

On November 4, 2016, the FL TIG invited the public to submit project ideas related to the following Restoration Types: Habitat Projects on Federally Managed Lands (specifically at GUIS and St. Vincent NWR), Nutrient Reduction, Water Quality, and Provide and Enhance Recreational Opportunities. The FL TIG screened projects that were submitted to either the Trustee project portal[17] or the state project portal[18] by December 5, 2016. Consistent with Section 9.4.1.4 of the Trustee SOPs, the FL TIG also considered project ideas developed by the FL TIG, by individual FL TIG Trustees, and project ideas from Gulf restoration reports, management plans, and related efforts.

The FL TIG categorized each project submission by Restoration Type and screened out those that did not fall under at least one of the four Restoration Types covered in this RP/EA. The FL TIG then screened the compiled list of project ideas for eligibility based on the stated purpose and need, specified evaluation criteria, and other practical considerations. Criteria applied during the eligibility screening process are listed below.

1) Projects should have a nexus to injury from the DWH oil spill;
2) Projects should, based on initial review, meet OPA NRDA regulatory criteria as set forth in CFR 990.54;
3) Projects should not have been previously completed or fully funded;
4) Projects should have sufficient information for evaluation (e.g., general location, activities, etc.);

[15] The Trustees define a 'user-day' as any time an individual visits a beach, goes fishing, or goes boating for the purpose of recreation for at least part of the day.
[16] The Phase V.2 RP/SEA can be found at: www.gulfspillrestoration.noaa.gov/sites/default/files/2018_02_FL_TIG_Final%20Phase%20V.2%20RP-SEA.pdf
[17] DWH Trustee website: www.gulfspillrestoration.noaa.gov
[18] Florida DWH website: www.deepwaterhorizonflorida.com

5) Projects related to the Habitat Projects on Federally Managed Lands Restoration Type should occur on GUIS or St. Vincent NWR.

2.4.2 Secondary Screening

After the eligibility screening (Section 2.4.1), the FL TIG divided the projects into three lists: 1) projects related to the Habitat Projects on Federally Managed Lands Restoration Type; 2) projects related to the Nutrient Reduction and Water Quality Restoration Types; and 3) projects related to the Provide and Enhance Recreational Opportunities Restoration Type. Projects under the Nutrient Reduction and Water Quality Restoration Types were screened together as both fall under the same Restoration Goal: Restore Water Quality.

Criteria applied during the secondary screening process are listed below. During this process, the FL TIG also considered the possibility for grouping/combining project ideas to improve final screening or the development of alternatives.

1) Projects should be consistent with PDARP/PEIS Restoration Goals and Types, strategy, approaches, and techniques to identify the highest-quality projects that will effectively contribute to meeting the FL TIG's goals;
2) Projects should be consistent with OPA NRDA regulatory criteria to help identify any concerns that might affect the FL TIG's ability to implement a project.

2.4.3 Final Screening

In the final screening process, the FL TIG identified a final set of project ideas for further evaluation. Final screening included the following:

1) Evaluation of PDARP/PEIS criteria for each project by Restoration Type;
2) Evaluation of additional screening criteria requested in the public solicitation of projects: "Restoration projects will seek to leverage other restoration projects and activities, including, but not limited to, DWH Early Restoration, RESTORE Act and NFWF's GEBF";
3) Consideration of funding availability.

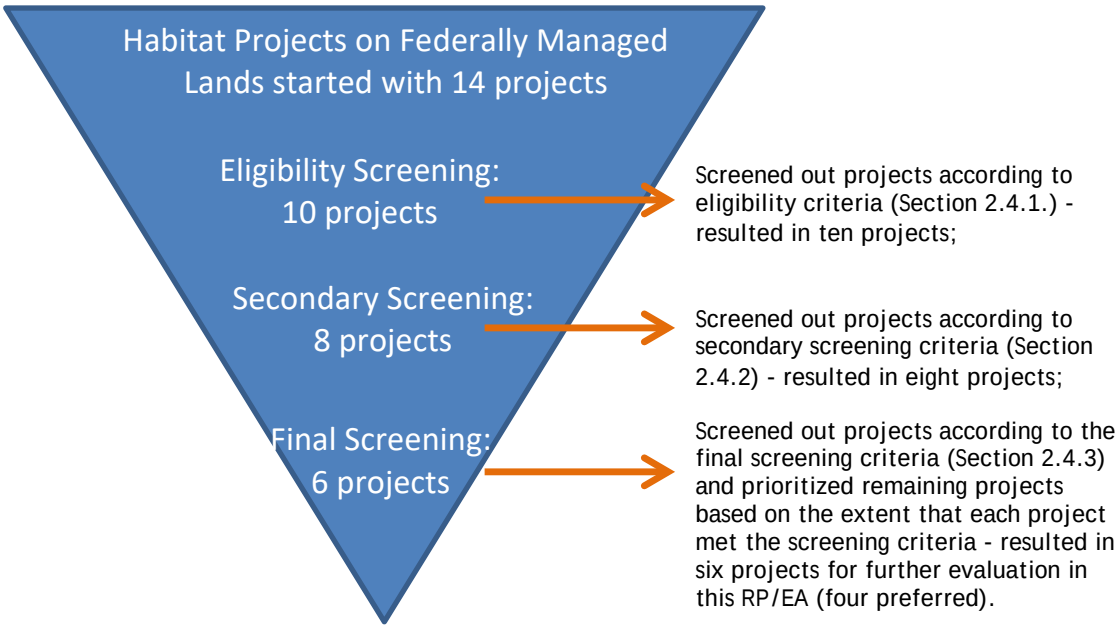
2.4.4 Screening Process for Alternatives within each Restoration Type

The above screening processes (Sections 2.4.1 to 2.4.3) resulted in the identification of the reasonable range of alternatives for each Restoration Type for further evaluation in this RP/EA. Details of each screening process by Restoration Type are provided below.

2.4.4.1 Habitat Projects on Federally Managed Lands

The FL TIG began the screening process for the Habitat Projects on Federally Managed Lands Restoration Type with 14 projects. The screening process for this Restoration Type is described in Figure 2-1.

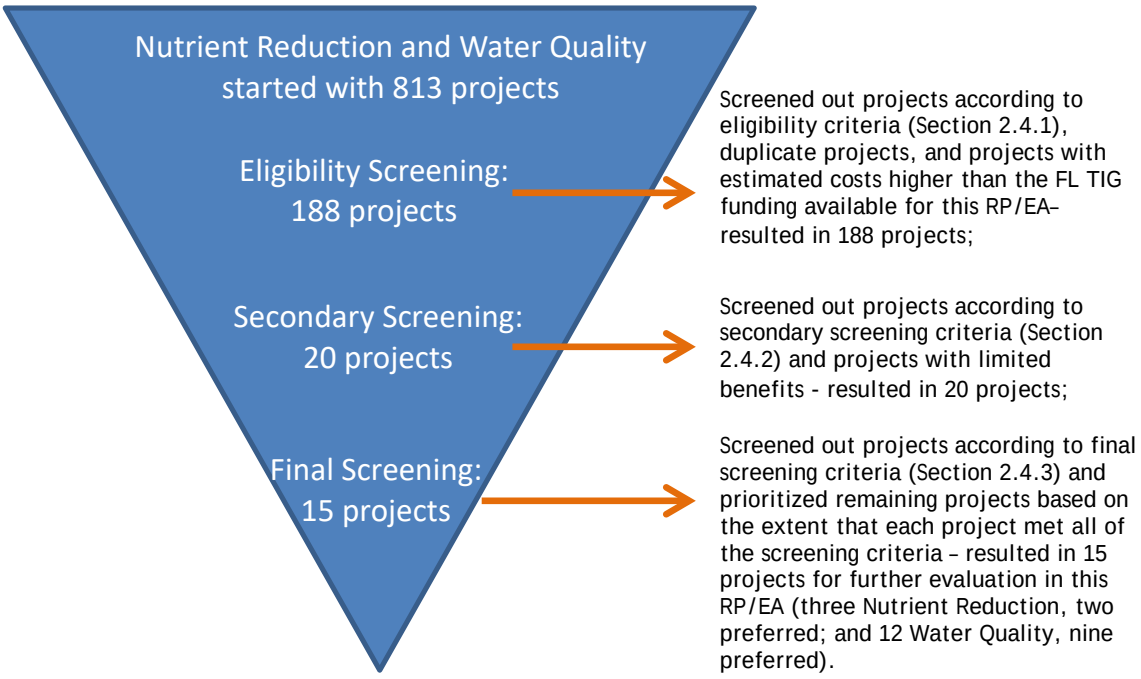
Figure 2-1 Illustration of the screening process for a reasonable range of alternatives for the Habitat Projects on Federally Managed Lands Restoration Type



2.4.4.2 Nutrient Reduction and Water Quality

The FL TIG began the screening process for the Water Quality and Nutrient Reduction Restoration Types with 813 projects. The screening process for these Restoration Types is described in Figure 2-2. During the secondary and final screening processes, the FL TIG also considered the extent to which a project had been identified in an existing state or federal water quality restoration plan and would support the goals and objectives of those plans (e.g., Surface Water Improvement and Management [SWIM] plans, 319 plans, USDA-Natural Resources Conservation Service [NRCS] plans, Total Maximum Daily Loads [TMDLs], and Basin Management Action Plans [BMAPs]); whether the project would protect critical areas for water quality restoration (e.g., aquifers or recharge areas) and/or provide recreational use benefits; and the extent to which a project would address threats to water quality from wastewater and/or septic systems through innovative methods.

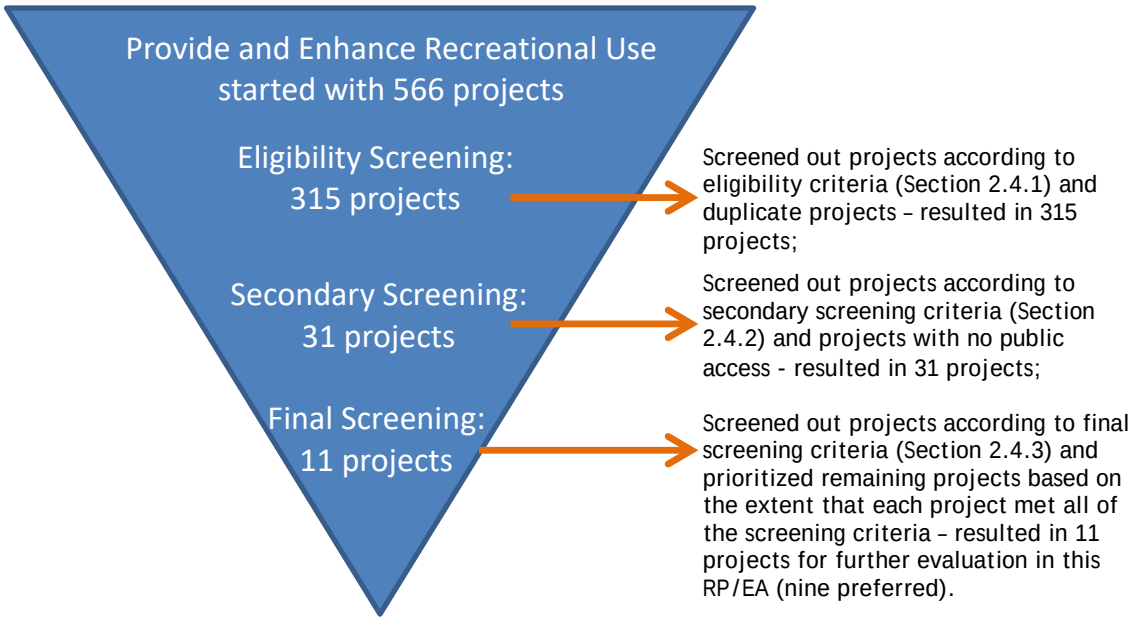
Figure 2-2 Illustration of the screening process for a reasonable range of alternatives for the Nutrient Reduction and Water Quality Restoration Types



2.4.4.3 Provide and Enhance Recreational Use Opportunities

The FL TIG began the screening process for the Provide and Enhance Recreational Use Opportunities with 556 projects. The screening process for this Restoration Type is described in Figure 2-3. During the secondary and final screening processes, the FL TIG also considered the extent to which a project would create access to Gulf of Mexico resources in an area where no or little public access currently exists; whether a project would provide a significant increase or would significantly enhance recreational use; and whether a project would educate the public in the use and/or enjoyment of Gulf of Mexico natural resources.

Figure 2-3 **Illustration of the screening process for a reasonable range of alternatives for the Provide and Enhance Recreational Use Opportunities Restoration Type**



2.4.5 Alternatives Not Considered for Further Evaluation

As described in Section 2.4.4, the FL TIG evaluated hundreds of projects against screening criteria, including a preliminary evaluation against OPA NRDA regulatory criteria. Projects that were not considered for further evaluation in this RP/EA either did not meet the eligibility, OPA, and/or other screening criteria; were not prioritized due to the extent that each project met the criteria; and/or were not consistent with the FL TIG's funding considerations. Projects not identified for further evaluation in this RP/EA may be identified for consideration in a future restoration plan.

2.5 Reasonable Range of Alternatives

Based on the screening process described in Section 2.4, the FL TIG identified a reasonable range of alternatives for further evaluation in this RP/EA (see Table 2-2). The alternatives considered in this RP/EA are consistent with four of the Restoration Types from the PDARP/PEIS, as follows:

- Habitat Projects on Federally Managed Lands: six alternatives (Section 2.5.1);
- Nutrient Reduction: three alternatives (Section 2.5.2);
- Water Quality: 12 alternatives (Section 2.5.3); and
- Provide and Enhance Recreational Opportunities: 11 alternatives (Section 2.5.4).

Five of the alternatives (one under Habitat Projects on Federally Managed Lands and four under Water Quality) include only planning, feasibility, design, engineering, and/or permitting activities (hereafter identified as "P&D" projects). These are being proposed as preliminary planning projects to allow the FL

TIG to conduct a range of activities that will provide information necessary to consider a subsequent implementation phase in a future restoration plan. The remaining 28 alternatives include implementation actions (including construction in some cases) after all regulatory compliance and permitting requirements are met. Projects not included in the reasonable range of alternatives, not identified as preferred at this time, or not selected for implementation may continue to be considered for inclusion in future restoration plans developed by the FL TIG.

Table 2-2 List of the reasonable range of restoration alternatives proposed in this RP/EA (including estimated project costs)

Reasonable Range of Restoration Alternatives		Estimated Project Costs
Restoration Type: Habitat Projects on Federally Managed Lands (FM)[1]		
FM1. Gulf Islands National Seashore (Florida) Beneficial Use of Dredged Materials at Perdido Pass	-	$4,783,847
FM2. Gulf Islands National Seashore (Florida) Night Sky Restoration (P&D)[2]	Preferred[3]	$432,093
FM3. Gulf Islands National Seashore (Florida) Night Sky Restoration (Implementation)	-	$7,669,834
FM4. Gulf Islands National Seashore (Florida) Beach and Dune Habitat Protection	Preferred	$853,821
FM5. Gulf Islands National Seashore (Florida) Invasive Plant Removal	Preferred	$875,765
FM6. St. Vincent National Wildlife Refuge Predator Control	Preferred	$ 580,772
Restoration Type: Nutrient Reduction (NR)[1]		
NR1. Pensacola Bay and Perdido River Watersheds - Nutrient Reduction	Preferred	$2,100,000
NR2. Apalachicola Bay Watershed - Nutrient Reduction	-	$3,150,000
NR3. Lower Suwannee River Watershed - Nutrient Reduction	Preferred	$3,150,000
Restoration Type: Water Quality (WQ)[1]		
WQ1. Carpenter Creek Headwaters Water Quality Improvements	Preferred	$1,689,900
WQ2. Pensacola Beach Reclaimed Water System Expansion	Preferred	$4,683,404
WQ3. Rattlesnake Bluff Road and Riverbank Restoration	Preferred	$3,149,091
WQ4. Pensacola Bay Unpaved Roads Initiative (P&D)	Preferred	$705,473
WQ5. Alligator Lake Coastal Dune Lake Hydrologic Restoration	Preferred	$1,382,400
WQ6. Grand Lagoon Regional Stormwater Facility	-	$3,210,910
WQ7. St. Andrew Bay Unpaved Roads Initiative (P&D)	-	$705,473
WQ8. City of Port St. Joe Stormwater Improvements	Preferred	$961,000
WQ9. MK Ranch Hydrologic Restoration	-	$27,484,932
WQ10. City of Carrabelle's Lighthouse Estates: Septic Tank Abatement - Phase II	Preferred	$3,237,986
WQ11. Lower Suwannee National Wildlife Refuge Hydrologic Restoration (P&D)	Preferred	$500,000
WQ12. Lower Charlotte Harbor Flatwoods Hydrologic Restoration Initiative, Yucca Pens Unit (P&D)	Preferred	$636,500
Restoration Type: Provide and Enhance Recreational Opportunities (REC)[1]		
REC1. Perdido Bay Sunset Islands Snorkeling Trail	-	$840,000

REC2. Tarkiln Bayou Preserve State Park Improvements	-	$2,719,670
REC3. Perdido River and Bay Paddle Trail	Preferred	$1,165,488
REC4. Carpenter Creek Headwaters Park Amenities	Preferred	$446,080
REC5. Gulf Islands National Seashore (Florida) Rehabilitation of Okaloosa Unit Recreational Facilities	Preferred	$3,201,383
REC6. Joe's Bayou Recreation Area Improvements	Preferred	$12,202,891
REC7. Topsail Hill Preserve State Park Improvements	Preferred	$3,926,811
REC8. Camp Helen State Park Improvements	Preferred	$3,326,027
REC9. St. Andrews State Park Improvements	Preferred	$10,875,855
REC10. T.H. Stone Memorial St. Joseph Peninsula State Park Improvements	Preferred	$977,945
REC11. St. Marks National Wildlife Refuge Coastal Trail Connection, Spring Creek to Port Leon	Preferred	$1,200,000
Subtotal for Preferred Alternatives		**$62,260,685**

[1] FM = Habitat Projects on Federally Managed Lands; NR = Nutrient Reduction; WQ = Water Quality; REC = Provide and Enhance Recreational Opportunities.
[2] P&D indicates projects that include planning, feasibility, design, engineering, and/or permitting activities only (i.e., not actions related to implementation or construction).
[3] Preferred indicates projects that have been identified as preferred for funding by the FL TIG at this time.

Each project description identifies the PDARP/PEIS Restoration Type-specific Restoration Approach and Technique associated with the project, the project location, a summary of the project, details related to specific project activities and implementation, a summary of maintenance activities and project monitoring, and the estimated project costs.

2.5.1 Project Descriptions: Habitat Projects on Federally Managed Lands

This RP/EA identifies six restoration alternatives consistent with the Restore and Conserve Habitat Restoration Goal (PDARP/PEIS Section 5.3.1) and underlying Habitat Projects on Federally Managed Lands Restoration Type (PDARP/PEIS Section 5.5.3):

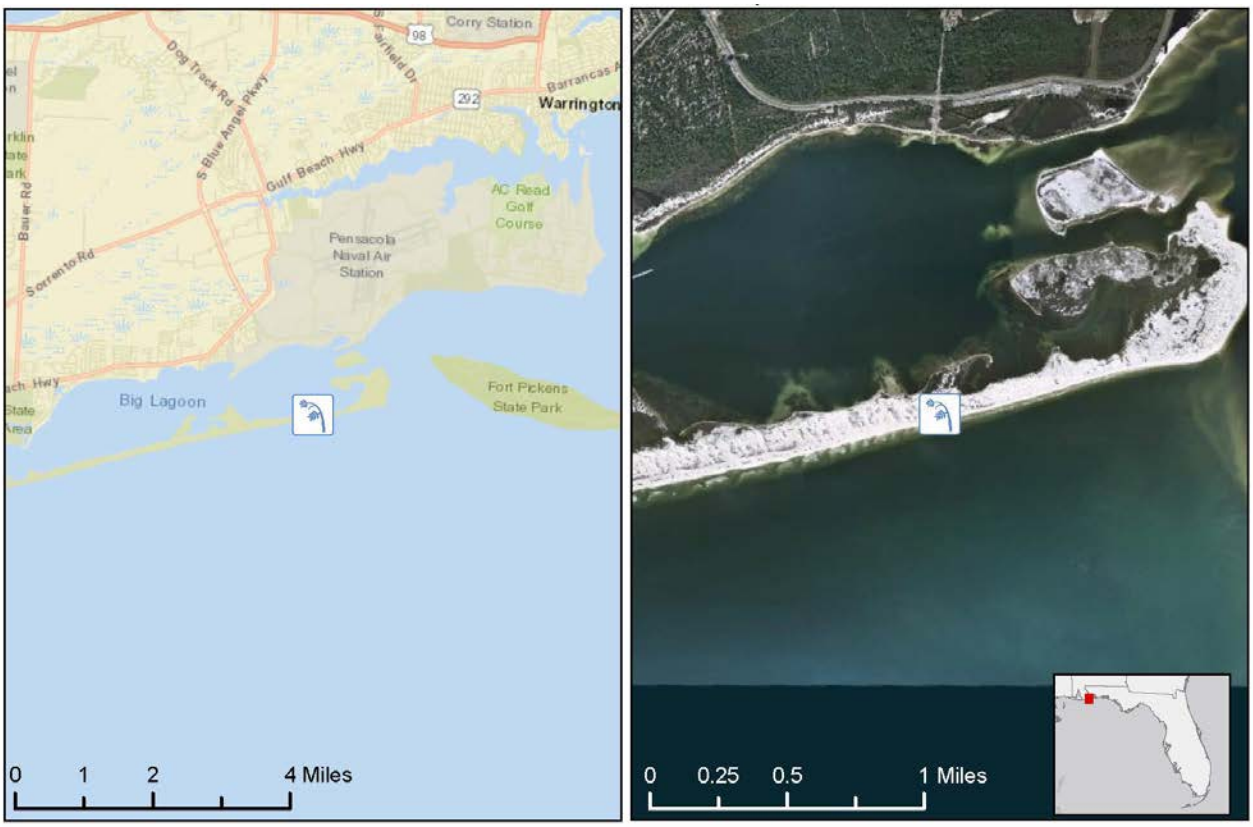
1. Gulf Islands National Seashore (Florida) Beneficial Use of Dredged Materials at Perdido Pass;
2. Gulf Islands National Seashore (Florida) Night Sky Restoration (P&D) (preferred);
3. Gulf Islands National Seashore (Florida) Night Sky Restoration (Implementation);
4. Gulf Islands National Seashore (Florida) Beach and Dune Habitat Protection (preferred);
5. Gulf Islands National Seashore (Florida) Invasive Plant Removal (preferred);
6. St. Vincent National Wildlife Refuge Predator Control (preferred).

A description of each of these restoration alternatives is provided below.

FM1, Gulf Islands National Seashore (Florida) Beneficial Use of Dredged Materials at Perdido Pass

Restoration Approach
Create, restore, and enhance barrier and coastal islands and headlands (PDARP/PEIS Section 5.5.3)
Restoration Technique
Restore and enhance dunes and beaches through placement of dredged material (PDARP/PEIS Appendix 5.D.1.4)
Project Location
GUIS, Florida District, Perdido Key area (Figure 2-4)
Project Summary
The project would be implemented by the DOI FL TIG Trustee and NPS in coordination with GUIS staff and the U.S. Army Corps of Engineers (USACE). This project would improve and increase beach habitat on the Gulf of Mexico side of Perdido Key, a barrier island south of Pensacola, Florida. The project would address the unnaturally eroded beach by re-introducing sand back into the barrier island system along the southeast shore of Perdido Key. With episodic overwash events, it should also increase sandy habitat elsewhere on the Key, north of the primary dune line. Specifically, the project would include: • Re-introduction of sand into the barrier island system through swash zone placement (or other method). A pipeline would be run from the dredging operation at Pensacola Pass to the swash zone (the part of the beach with turbulent water, generally between 3-12 feet below mean low water line). This method keeps the maximum amount of sand near or on the beach where the surf can move the sand around naturally, increasing beach habitat for use by animals (e.g., sea turtles, beach mice, and birds) and humans. This method was implemented at Perdido Key from November 2011 to January 2012 when 520,000 cubic yards were placed along the southeast shore; • Restoration using suitable sand from sources outside the natural sources of sediment for the eroding beach (e.g., a borrow site with similar physical and chemical sediment characteristics to the restoration site). The project would help restore dunes and beaches that provide important coastal habitat for shorebirds, beach mice, and sea turtles. The project would also serve to restore popular recreational areas for local visitors and tourists.
Project Activities and Implementation Details
Project activities include environmental compliance surveys in the sand placement zone, sand placement, project monitoring, and oversight. The project would only fund the portion for USACE to deposit the sand in the swash zone in GUIS. USACE would fund the remainder of the project. It is uncertain when this project could be implemented due to the uncertainty in timing for the next dredging operation of the channel into Pensacola Bay by the USACE.
Maintenance
None anticipated.
Project Monitoring
This project has not been identified as a preferred alternative by the FL TIG at this time, and therefore a project MAM plan has not been developed.
Costs
The estimated costs are $4,783,847 and include compliance surveys, sand placement, project monitoring, and oversight.

Figure 2-4 **FM1, Gulf Islands National Seashore (Florida) Beneficial Use of Dredged Materials at Perdido Pass: General Project Location**

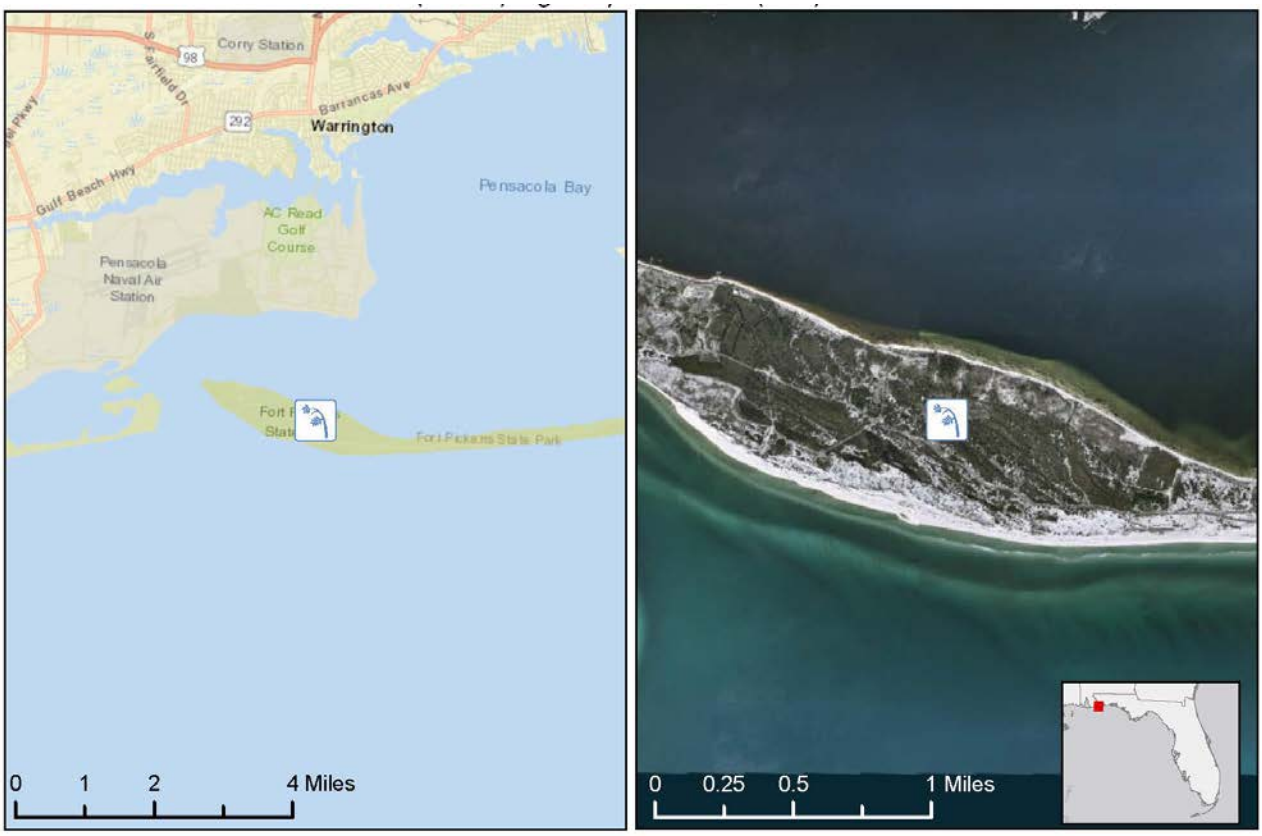


FM2, Gulf Islands National Seashore (Florida) Night Sky Restoration (P&D) (preferred)

Restoration Approach
Protect and conserve marine, coastal, estuarine, and riparian habitats (PDARP/PEIS Section 5.5.3)
Restoration Technique
Develop and implement management actions in conservation areas and/or restoration projects (PDARP/PEIS Appendix 5.D.1.7)
Project Location
GUIS, Florida District and adjacent cities including Pensacola, Navarre, and Warrington (Figure 2-5)
Project Summary
The project would be implemented by the DOI FL TIG Trustee and the NPS Resource Protection Branch and Natural Sounds and Night Skies Division (NSNSD) in coordination with the GUIS staff. Other project partners include the USFWS, the Department of Energy (DOE), FWC, lighting manufacturers, cities of Pensacola, West Pensacola, Warrington, Navarre, Escambia County, Gulf Power, and the Florida Department of Transportation (FDOT). This project would improve habitat on GUIS by determining the best way to reduce artificial light in the project area, which is a goal identified within the GUIS General Management Plan (NPS 2014)). This project also builds on work completed through the DWH Early Restoration Phase II project: Improving Habitat Injured by Spill Response: Restoring the Night Sky and the GEBF project: Eliminating Light Pollution at Sea Turtle Nesting Beaches (Phase II). The project is being proposed in two phases. Phase I only includes P&D activities, which would help the FL TIG plan for a future Phase II implementation of retrofits and lighting practices to help restore and improve coastal habitats at GUIS damaged by the DWH oil spill. Phase I would result in a report for upgrading materials and practices for lighting that presently trespasses onto and pollutes habitat on GUIS and, incidentally, on nearby coastal and marine areas, in Escambia County, Florida. As light pollution that affects wildlife at GUIS is measured, understood, and experimentally decreased, GUIS habitat is improved. Specifically, the project would include: • An assessment of the baseline night sky conditions and human and wildlife responses to pilot lighting tests; • An assessment of artificial lighting on coastal habitat by: a) using remote sensing and NPS data products to measure sky brightness and identify locations within the communities in the project area that disproportionately contribute to light, and b) producing an inventory of municipal lighting currently in use; • Development of a detailed strategy to improve the identified problematic lighting by a) evaluating the potential economic and environmental benefits of the new lighting, b) conducting pilot tests of alternative lighting systems to assess public and ecological responses to different lighting options, and c) making recommendations about locations to work in and the types of lights and controls that should be installed in Phase II; • Development of a report(s) describing the methods and summarizing the findings and recommendations for Phase II. Coastal lights and sky glow have wide-ranging impacts on wildlife including sea turtle hatchling disorientation (Witherington and Martin 2003), alteration of daily and seasonal light cycles (Bird et al. 2004, Longcore and Rich 2004, Montevecchi 2006, Gaston et al. 2012, 2013), negative impacts on species migration (Ringleberg 1999, Moore et al. 2001), and impacts on dispersal and settlement of marine invertebrate larvae (Thorson 1964). This project would provide a wide range of environmental benefits to GUIS habitat as well as nearby coastal and marine habitats.

Project Activities and Implementation Details
Project activities include P&D, program oversight and management, support to inventory and analyze municipal lighting and develop and implement pilot lighting tests, support to evaluate the responses to pilot lighting tests, and support to develop a report with recommendations. The project would be implemented over approximately two years. In Year 1, project contracting; inventory of lighting currently in use; data collection on sky brightness measurements; evaluation of options for lighting upgrades; identification of most cost-effective opportunities; and the report would be completed. In Year 2, the pilot lighting trials and evaluation of citizen and wildlife responses would be implemented, and a report prepared.
Maintenance
New lighting materials and practices installed as part of the pilot projects would be temporary and would require no maintenance.
Project Monitoring
Consistent with Section 10 of the Trustee SOPs, a MAM plan is not required for projects with only P&D activities, and therefore a MAM plan for this project has not been developed.
Costs
The estimated costs are $432,093 and include P&D, support personnel, equipment, monitoring, coordination, reporting, and administrative oversight.

Figure 2-5 FM2, Gulf Islands National Seashore (Florida) Night Sky Restoration (P&D): General Project Location

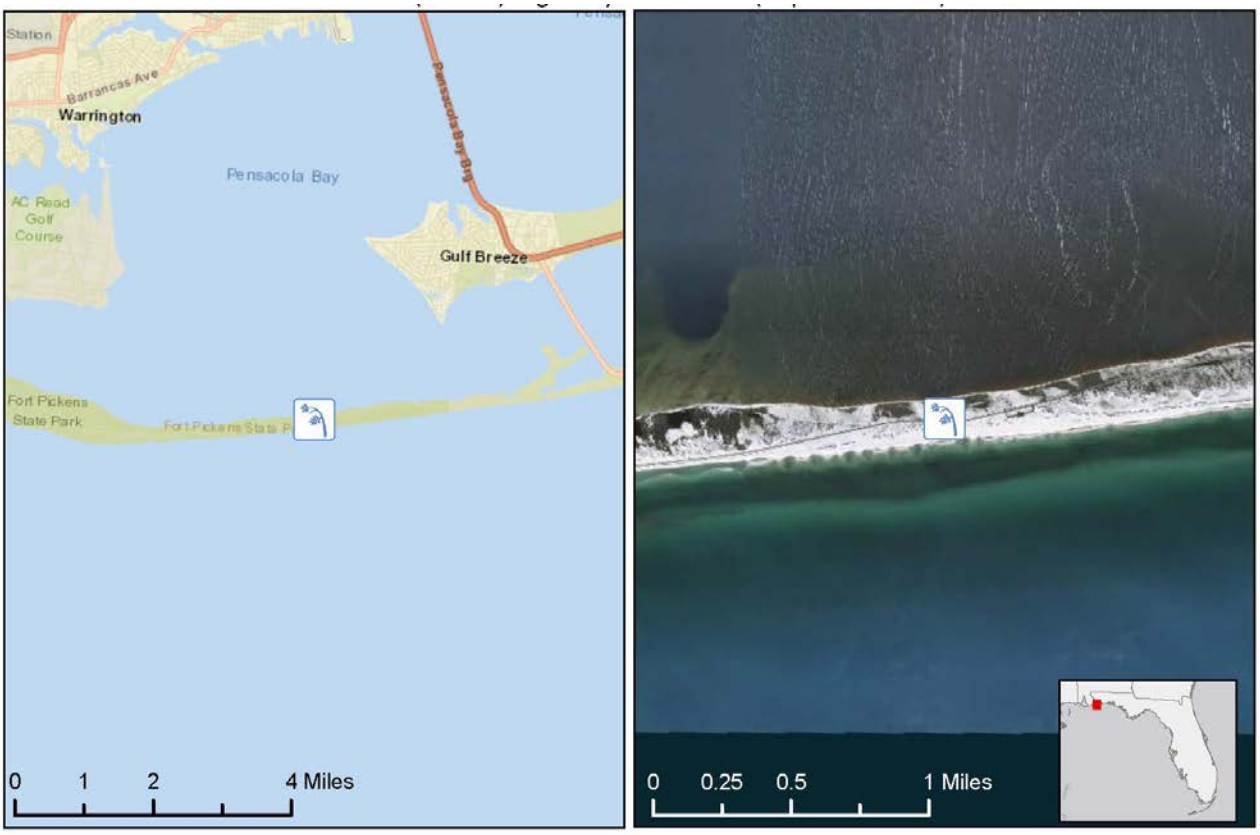


FM3, Gulf Islands National Seashore (Florida) Night Sky Restoration (Implementation)

Restoration Approach
Protect and conserve marine, coastal, estuarine, and riparian habitats (PDARP/PEIS Section 5.5.3)
Restoration Technique
Develop and implement management actions in conservation areas and/or restoration projects (PDARP/PEIS Appendix 5.D.1.7)
Project Location
Areas with artificial lighting in and adjacent to GUIS, Florida District (initial data indicates that most of the improvements could take place within the cities of Pensacola, Warrington, Pensacola Beach, and the nearshore communities from Gulf Breeze to Fort Walton Beach) (Figure 2-6)
Project Summary
The project would be implemented by the DOI FL TIG Trustee in coordination with NPS (Resource Protection Branch and NSNSD) and GUIS staff. Other project partners include USFWS, DOE, FWC, lighting manufacturers, cities of Pensacola, West Pensacola, Warrington, Navarre, Escambia County, Santa Rosa County, Okaloosa County, Gulf Power, FDOT, and the Sea Turtle Conservancy. The project includes the implementation phase (Phase II) of the Gulf Islands National Seashore Night Sky Restoration – Phase I project described above (FM1). The project would be designed based on Phase I findings (see FM2, Gulf Islands National Seashore (Florida) Night Sky Restoration (P&D)) and would depend on a) the results of the lighting inventory and the sky brightness measurements, b) the number and location of willing municipalities, businesses, and private citizens, and c) funding limitations. Similarly to FM2, this project would build on work completed through the DWH Early Restoration Phase II project: Improving Habitat Injured by Spill Response: Restoring the Night Sky and the GEBF project: Eliminating Light Pollution at Sea Turtle Nesting Beaches (Phase II). Specifically, the project would include: • Public outreach activities to identify willing participants; • Development of site-specific "Individual Lighting Plans" to replace existing luminaires and bulbs on properties of willing municipalities/businesses/property owners; • Implementation of outdoor lighting upgrades (which lights to target and what types of luminaires/bulbs to install would be based on Phase I findings) in communities that affect habitats at GUIS. This could include lighting hardware improvements (e.g., luminaires, bulbs, controls) in municipal (e.g., streetlights, parking lots), commercial (e.g., buildings, parking lots), and private settings (e.g., homes, condominiums); • Enhancement of lighting practices (e.g., illumination schedules); • Monitoring activities including before-and-after lighting impact assessments. Coastal lights and sky glow have wide-ranging impacts on wildlife including sea turtle hatchling disorientation (Witherington and Martin 2003), alteration of daily and seasonal light cycles (Bird et al. 2004, Longcore and Rich 2004, Montevecchi 2006, Gaston et al. 2012, 2013), negative impacts on species migration (Ringleberg 1999, Moore et al. 2001), and impacts on dispersal and settlement of marine invertebrate larvae (Thorson 1964). The project would provide a wide range of environmental benefits to GUIS habitat as well as nearby coastal and marine habitats. The project would improve coastal habitat on federally managed lands while improving public night vision performance, providing a greater margin of safety for potential public health effects (AMA 2016), and reducing maintenance and electricity costs, all while maintaining public safety.

Project Activities and Implementation Details
Project activities include public outreach activities to identify willing participants, technical assistance to produce Individual Lighting Plans for lighting upgrades, implementation of lighting upgrades, and monitoring of light trespass and sky glow in the project area. The project would be completed in approximately four years.
Maintenance
Maintenance activities would include monitoring and maintaining light fixtures by program participants. Long-term maintenance costs would be significantly lower because the upgraded outdoor lighting systems have longer operating lifetimes and are more resistant to damage.
Project Monitoring
This project has not been identified as a preferred alternative by the FL TIG at this time, and therefore a project MAM plan has not been developed.
Costs
The costs would be based on the Phase I findings and depend on the level of participation, but are estimated to be $7,669,834 and include program oversight and management, design and installation of lighting upgrades, supplies, and contingency costs.

Figure2- 6 FM3, Gulf Islands National Seashore (Florida) Night Sky Restoration (Implementation): General Project Location

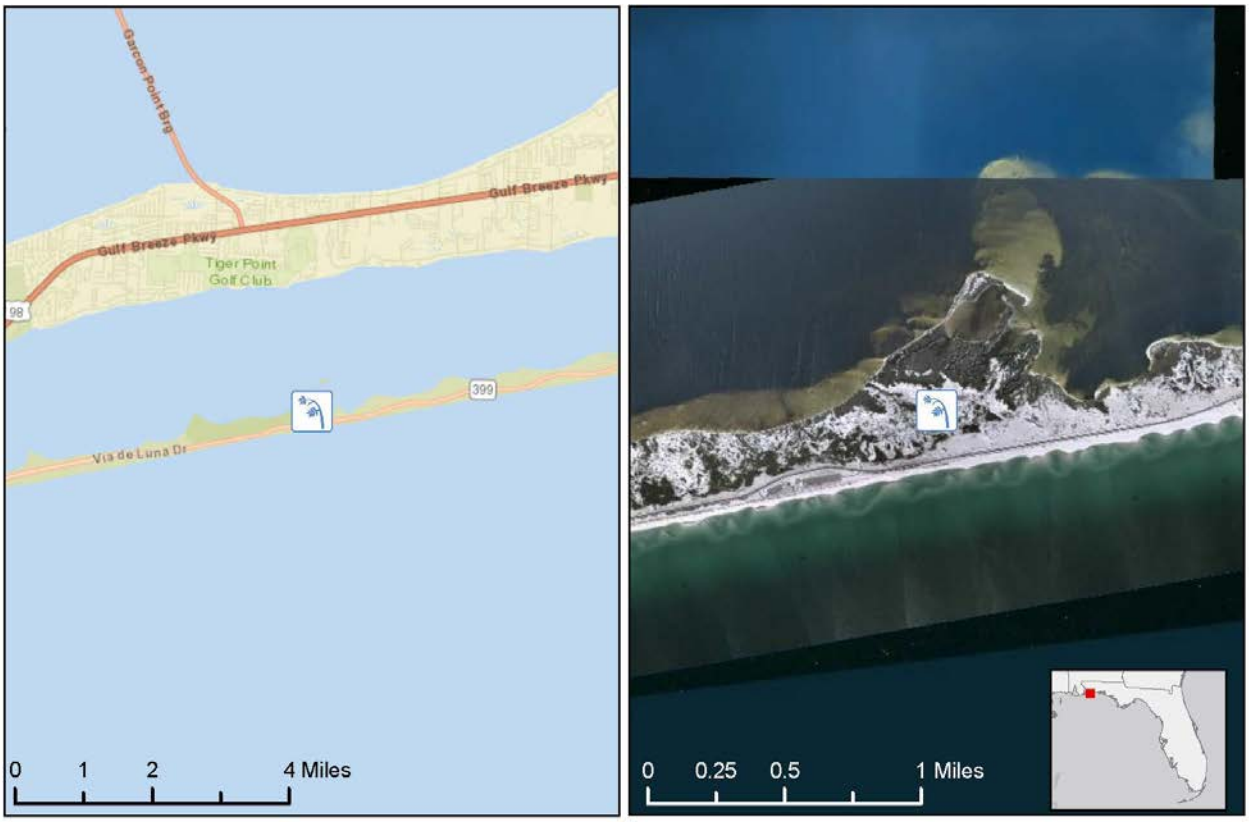


FM4, Gulf Islands National Seashore (Florida) Beach and Dune Habitat Protection (preferred)

Restoration Approach
Restore and enhance dunes and beaches (PDARP/PEIS Section 5.5.3)
Restoration Technique
Protect dune systems through the use of access control (PDARP/PEIS Appendix 5.D.1.5)
Project Location
GUIS, Florida District (Perdido Key, Fort Pickens, and Santa Rosa Areas) (Figure 2-7)
Project Summary
The project would be implemented by the DOI FL TIG Trustee in coordination with the NPS and GUIS staff. Other project partners include USDA Animal and Plant Health Inspection Service Wildlife Services (USDA-APHIS-WS), University of Florida (UF), FWC, USFWS, and Audubon. The project would protect beach habitat at GUIS and associated wildlife from three different threats: 1) humans impacts on beaches, 2) predators, and 3) vehicle collisions on paved roads. This project would build on work completed through the DWH Early Restoration Phase II project: Improving Habitat Injured by Spill Response: Restoring the Night Sky, a GEBF project: Eliminating Light Pollution at Sea Turtle Nesting Beaches (Phase II), and the Restoring Florida's Shorebird & Seabird Populations – Phase I project. Specifically, this project would include: • Measures to temporarily close sensitive areas to protect habitat, wildlife, and nests and to prevent dune trampling and disturbance including symbolic fencing (i.e., post and rope fences), and/or the establishment of wildlife viewing areas at the edge of major bird colonies; • Public outreach materials to educate visitors on the habitats and wildlife (including breeding birds) such as score cards of hatches and mortality provided at the entrance stations; • Law enforcement patrols to monitor and control vehicle speeding rates and reduce vehicle collisions with wildlife; • Predator management activities, such as perch deterrents and nest enclosures to control populations and reduce impacts to shorebirds and sea turtles; • Monitoring and demographic surveys of individual animal and bird burrows, nests, and colonies for predator activity and human encroachment and to measure nesting and hatch rates (for birds). This information would provide insights into causes of mortality and allow for adaptive management throughout the project by identifying the most effective closure areas and protection methods that minimize impacts on human beachgoers. The project would help restore dunes and beaches that provide important coastal habitat for birds, beach mice, and sea turtles, allowing it to recover its natural vegetation and processes with as little disturbance as possible by installing and enforcing temporary access limitations such as fences and vehicular speed. These techniques would improve habitat connectivity and reduce visitor impacts on habitats and wildlife.
Project Activities and Implementation Details
Project activities include temporary closure measures, public outreach materials, law enforcement patrols, predator management activities, monitoring activities, cultural and tribal monitoring, and associated personnel support and oversight. The project would be completed in approximately three years during the spring/summer (i.e., February - August) when wildlife and bird activity (including breeding) is greatest. Demographic surveys, public education efforts, and contract procurement would begin first. After resource and tribal surveys are completed, temporary nest enclosures could be installed.

Maintenance
Short-term maintenance activities would include making sure speed signs are operating properly and that sign posts and temporary fencing are up and functioning. No long-term maintenance activities are anticipated.
Project Monitoring
Project monitoring details are provided in the project MAM plan found in Appendix B.
Costs
The estimated costs are $853,821 and include project oversight and management, labor, compliance activities, enforcement, supplies, vehicles, and contingency costs.

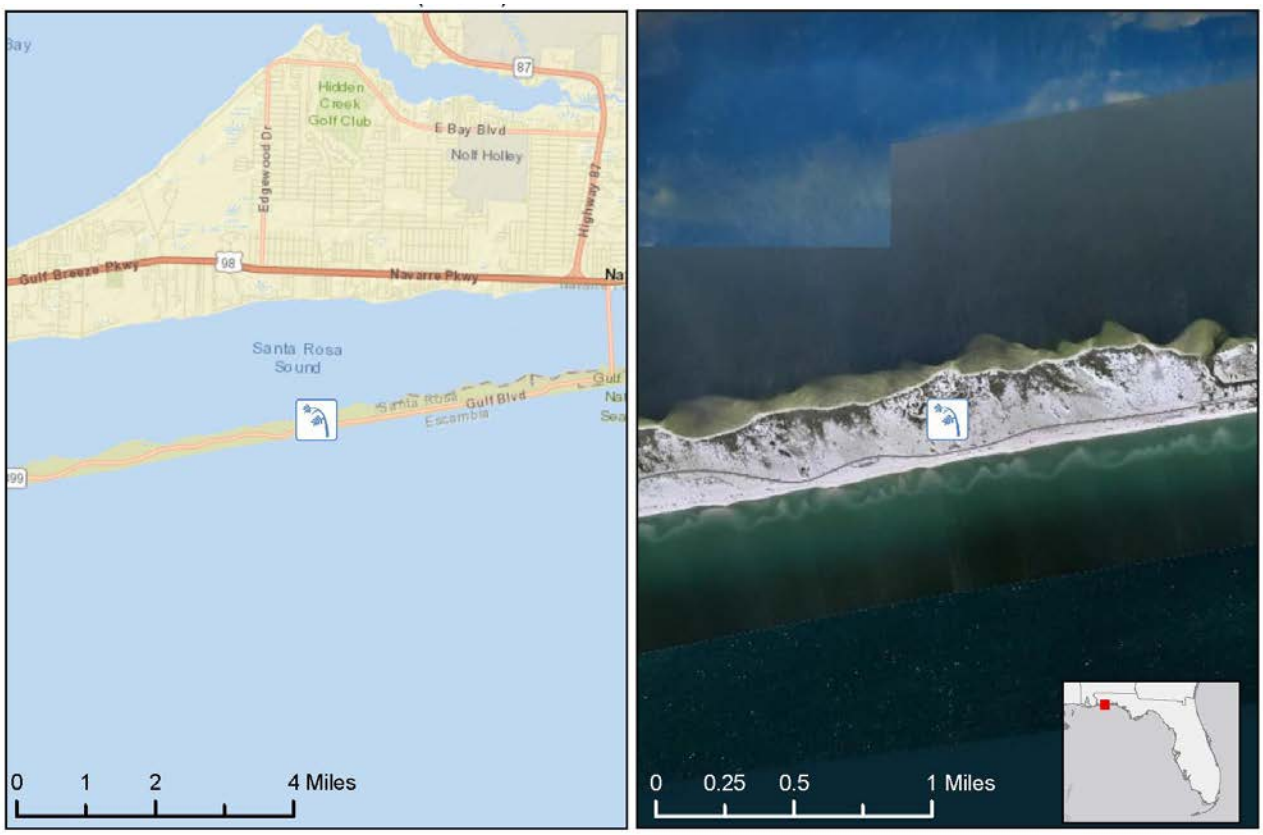
Figure 2-7 FM4, Gulf Islands National Seashore (Florida) Beach and Dune Habitat Protection: General Project Location



FM5, Gulf Islands National Seashore (Florida) Invasive Plant Removal (preferred)

Restoration Approach
Protect and conserve marine, coastal, estuarine, and riparian habitats (PDARP/PEIS Section 5.5.3)
Restoration Technique
Develop and implement management actions in conservation areas and/or restoration projects (PDARP/PEIS Appendix 5.D.1.7)
Project Location
GUIS, Florida District, Escambia County (Figure 2-8)
Project Summary
The project would be implemented by the DOI FL TIG Trustee in coordination with NPS and GUIS staff. Other project partners could include NPS Southeast Regional office, FDEP, Escambia County Extension Office, Gulf Coast Plain Ecosystem Partnership, and UF. This project includes activities to treat five of the most problematic invasive plant species in the Fort Pickens, Santa Rosa, and Perdido Key areas of GUIS more comprehensively than they are currently and to collect information on the invasive species to protect and conserve habitat and wildlife resources in the area. Specifically, the project would include: • Activities to locate and map five invasive plant species across the Fort Pickens, Santa Rosa, and Perdido Key areas: cogon grass (*Imperata cylindrical*), torpedo grass (*Panicum repens*), popcorn trees/Chinese tallow (*Sapium sebiterum*), Cuban bulrush (*Oxycaryum cubense*), and beach vitex (*Vitex rotundifolia*); • Evaluation of past and current treatment methods, research on new treatment methods, and development of a Treatment Action Plan (TAP); • Five years of treatment of the invasive species per the TAP to population sizes that can be more easily managed in the future (using primarily foliar chemical treatment with a backpack sprayer with additional hand-pulling and other methods such as seed removal or stump treatment as needed); • Monitoring throughout treatment process to determine the treatment plan for the following year; • Gathering of information to provide the basis for an Exotic Plant Management Plan for the Florida District of GUIS, should the park wish to prepare one; • Preparation of a project completion report (including recommendations for future treatments). The project would remove invasive plant species from natural areas at GUIS and help to gradually restore coastal habitats and native plant species. This, in turn, would likely allow native animal populations that depend on these coastal habitats and plants to improve.
Project Activities and Implementation Details
Project activities include hiring a project manager, bio-technician, and other personnel support; buying supplies; vehicular support; and associated oversight and contingencies. The project would be completed in approximately five to six years. The personnel hiring process would take approximately six months; the TAP would take approximately four months to prepare; two months for the inventory; two months to prepare maps and the final TAP; and three months to prepare the Project Completion Report.
Maintenance
None anticipated. Sites would be treated indefinitely into the future (as needed) with NPS funding (not project funds).
Project Monitoring
Project monitoring details are provided in the project MAM plan found in Appendix B.
Costs
The estimated costs are $875,765 and include planning, project personnel support, supplies, vehicular support, and oversight.

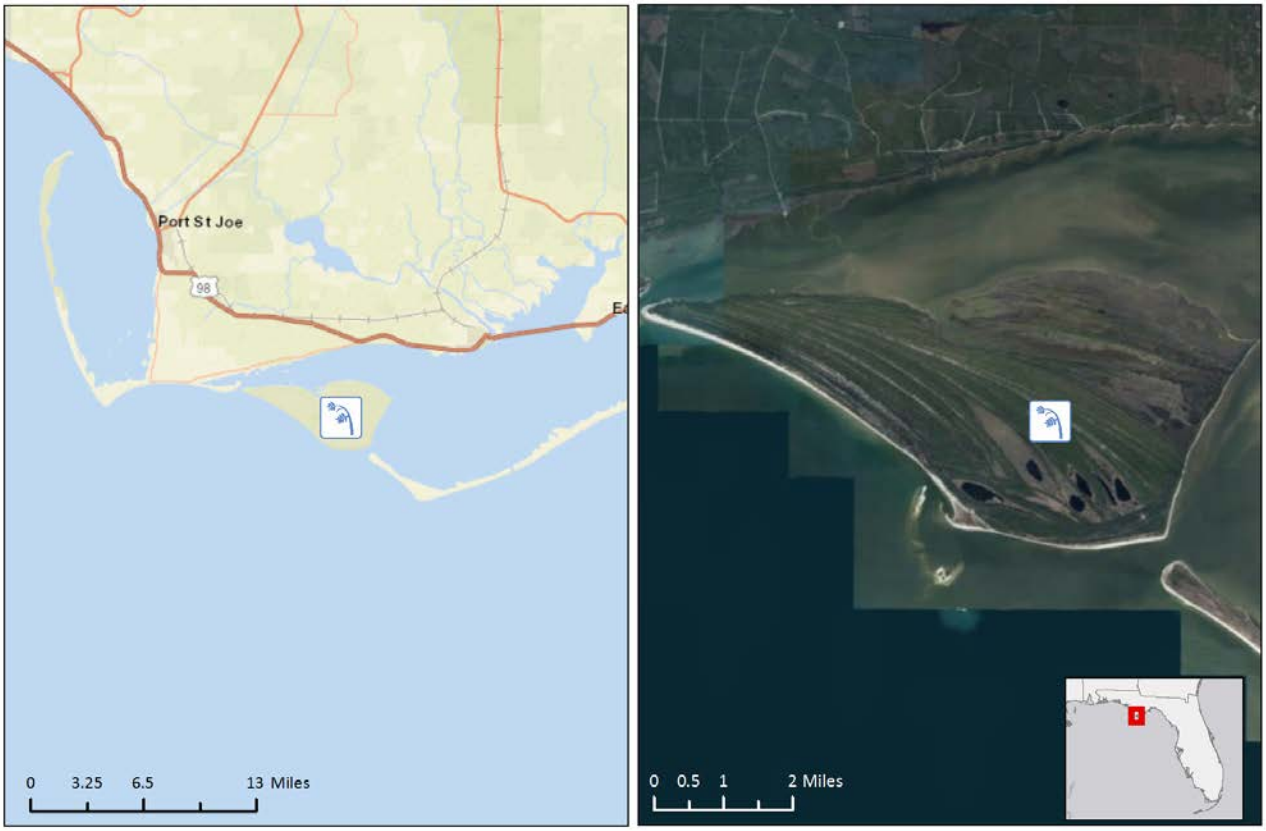
Figure 2-8 **FM5, Gulf Islands National Seashore (Florida) Invasive Plant Removal: General Project Location**



FM6, St. Vincent National Wildlife Refuge Predator Control (preferred)

Restoration Approach
Protect and conserve marine, coastal, estuarine, and riparian habitats (PDARP/PEIS Section 5.5.3)
Restoration Technique
Develop and implement management actions in conservation areas and/or restoration projects (PDARP/PEIS Appendix 5.D.1.7)
Project Location
St. Vincent NWR, Apalachicola, Florida (Figure 2-9)
Project Summary
The project would be implemented by the DOI FL TIG Trustee and the USFWS Gulf Restoration Office in coordination with the St. Vincent NWR staff and USDA-APHIS-WS. The project aims to protect and conserve habitat on St. Vincent NWR through actions to mitigate the negative impacts of feral hogs and raccoons to habitats and natural resources. This project would build on work completed as part of the DWH Early Restoration Phase II project: Enhanced Management of Avian Breeding Habitat Injured by Response in the Florida Panhandle, Alabama, and Mississippi. Specifically, the project would include: • Eradicating or controlling the feral hog and raccoon populations by locating, trapping, and eliminating these species; • Monitoring for evidence of predator-caused habitat degradation and/or mortality and disturbance of shorebird and sea turtle populations and nests to evaluate the success of the project. The project would help restore habitat and ecological services through the removal of feral hogs and control of raccoon populations on St. Vincent NWR that were injured by the DWH oil spill. The project would develop and implement management actions that enhance habitats and natural resources on St. Vincent NWR by addressing known causes of habitat degradation and/or mortality of threatened and endangered species and migratory birds. Long-term benefits to the resources and services injured by the spill include reduced mortality of endangered and threatened species, increased numbers of sea turtles and shorebirds, and enhanced habitat for fish and wildlife.
Project Activities and Implementation Details
Project activities include planning and implementation of management actions, monitoring, personnel and field technician support, coordination, reporting, and obtaining equipment needs (e.g., all-terrain vehicles, traps, and ammunition). The project would be completed in approximately two years. The first activities would include the completion of contracting, staffing, and equipment acquisition. After these activities are completed, the project would be implemented (working around sea turtle and shorebird nesting seasons).
Maintenance
None anticipated.
Project Monitoring
Project monitoring details are provided in the project MAM plan found in Appendix B.
Costs
The estimated costs are $580,772 and include planning, support personnel, equipment, implementation, monitoring, coordination, reporting, and administrative oversight.

Figure 2-9 FM6, St. Vincent National Wildlife Refuge Predator Control: General Project Location



2.5.2 Project Descriptions: Nutrient Reduction

This RP/EA identifies three restoration alternatives consistent with the Restore Water Quality Restoration Goal (PDARP/PEIS Section 5.3.1) and underlying Nutrient Reduction Restoration Type (PDARP/PEIS Section 5.5.4):

1. Pensacola Bay and Perdido River Watersheds – Nutrient Reduction (preferred);
2. Apalachicola Bay Watershed – Nutrient Reduction;
3. Lower Suwannee River Watershed – Nutrient Reduction (preferred).

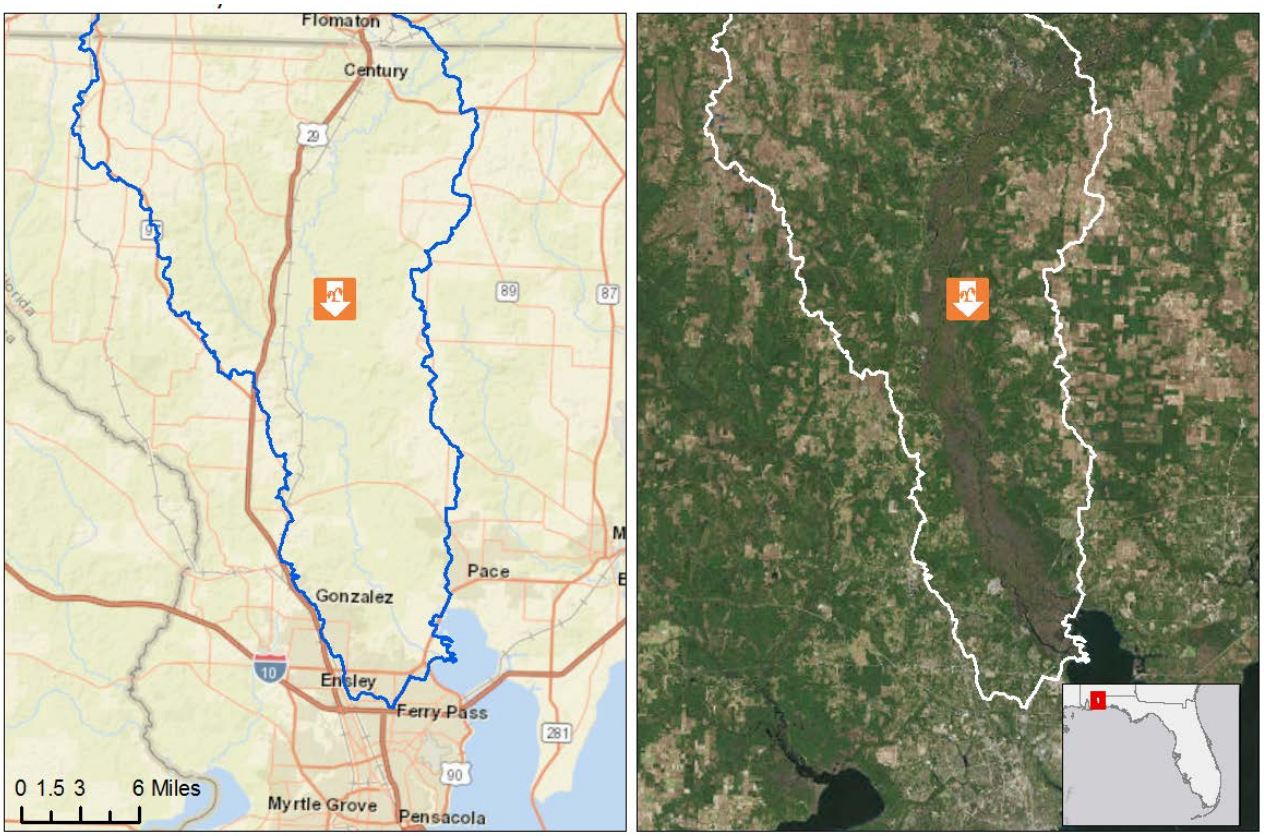
A description of each of these restoration alternatives is provided below.

NR1, Pensacola Bay and Perdido River Watersheds – Nutrient Reduction (preferred)

Restoration Approach
Reduce nutrient loads to coastal watersheds (PDARP/PEIS 5.5.4)
Restoration Technique
Agricultural conservation practices (PDARP/PEIS Appendix 5.D.2.1)
Project Location
Pensacola and Perdido Watersheds, Santa Rosa and Escambia Counties, Florida (Hydrologic Unit Code (HUC) 12 Watersheds: (1) Moore Creek – Santa Rosa County and (2) Sandy Hollow-Pine Barren Creek - Escambia County) (Figure 2-10)
Project Summary
The project would be implemented by the USDA FL TIG Trustee. This project would improve water quality by reducing sediment and nutrient (phosphorus and nitrogen) loads to Pensacola Bay and Perdido River watersheds through the development and implementation of conservation plans on agricultural lands. These plans aim to address nutrient and sediment runoff through the implementation of conservation practices (CPs). Specifically, the project would include: • Identifying willing landowners (i.e., voluntary participants); • Providing outreach and technical assistance to participants, especially on the most vulnerable acres in the watersheds, to develop conservation plans that identify natural resource concerns and CPs that can be implemented to reduce nutrient and sediment runoff; • Reducing nutrients and sediments carried into coastal waters through implementation of the conservation plans; The health of the Gulf of Mexico depends upon the health of its estuaries, which 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. Runoff from cropland, pasture, grassland, and forest contributes nutrients and sediments that adversely affect the health of coastal waters. While agricultural 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 concern at their sources (e.g., the lower Suwannee River watershed). The project would include implementing clusters of CPs on critical sources to make a discernable difference in water quality at the watershed level. The proposed CPs would reduce nutrient losses and loads from the landscape, streams, and downstream receiving waters and reduce water quality degradation in watersheds that would provide benefits to coastal watersheds and marine resources. While this targeted and concentrated approach is desired, the project is ultimately dependent on the participating landowners.

Project Activities and Implementation Details
Project activities include conservation planning, environmental compliance, engineering and design, permitting; implementation, program oversight, management, operations and maintenance, and monitoring. The project would be completed in approximately four years. Year 1 would consist primarily of landowner outreach and planning. Implementation of the conservation plans would begin in Year 2 and continue through Year 4. The project has been organized into four phases for implementation: 1) conservation planning (including landowner outreach and education) and environmental evaluation, 2) engineering and design, 3) implementation, and 4) monitoring. All of the project phases may be initiated simultaneously.
Maintenance
Short- and long-term maintenance includes actions to maintain CPs according to USDA standards and specifications.
Project Monitoring
Project monitoring details are provided in the project MAM plan found in Appendix B.
Costs
The estimated costs are $2,100,000 and include planning, compliance, engineering, permitting, implementation, monitoring, maintenance, oversight, and contingency costs.

Figure 2-10 NR1, Pensacola Bay and Perdido River Watersheds – Nutrient Reduction: General Project Location



NR2, Apalachicola Bay Watershed – Nutrient Reduction

Restoration Approach
Reduce nutrient loads to coastal watersheds (PDARP/PEIS 5.5.4)
Restoration Technique
Agricultural conservation practices (PDARP/PEIS Appendix 5.D.2.1)
Project Location
Apalachicola Bay Watershed, Florida (HUC 12 Watersheds: (1) Upper Dry Creek-Chipola River, (2) Lower Dry Creek-Chipola River, and (3) Alligator Creek-Holmes Creek) (Figure 2-11)
Project Summary
The project would be implemented by the USDA FL TIG Trustee. The project would improve water quality by reducing sediment and nutrient (phosphorus and nitrogen) loads to the Apalachicola Bay watershed through the development and implementation of conservation plans on agricultural lands. For additional information on the project, see the project description for NR1, Pensacola Bay and Perdido River Watersheds – Nutrient Reduction project, which includes the same activities.
Project Activities and Implementation Details
See the project description for NR1.
Maintenance
See the project description for NR1.
Project Monitoring
This project has not been identified as a preferred alternative by the FL TIG at this time, and therefore a project MAM plan has not been developed.
Costs
The estimated costs are $3,150,000 and include planning, compliance, engineering, permitting, implementation, monitoring, maintenance, oversight, and contingency costs.

Figure 2-11 NR2, Apalachicola Bay Watershed – Nutrient Reduction: General Project Location

NR3, Lower Suwannee River Watershed – Nutrient Reduction (preferred)

Restoration Approach
Reduce nutrient loads to coastal watersheds (PDARP/PEIS 5.5.4)
Restoration Technique
Agricultural conservation practices (PDARP/PEIS Appendix 5.D.2.1)
Project Location
Lower Suwannee River Watershed, Levy County, Florida (HUC 12 Watersheds: (1) Long Pond Slough, (2) Long Pond, and (3) Manatee Springs) (Figure 2-12)
Project Summary
The project would be implemented by the USDA FL TIG Trustee. The project would improve water quality by reducing sediment and nutrient (phosphorus and nitrogen) loads to the Lower Suwannee River watershed through the development and implementation of conservation plans on agricultural lands. For additional information on the project, see the project description for NR1, Pensacola Bay and Perdido River Watersheds – Nutrient Reduction project, which includes the same activities.
Project Activities and Implementation Details
See the project description for NR1.
Maintenance
See the project description for NR1.
Project Monitoring
Project monitoring details are provided in the project MAM plan found in Appendix B.
Costs
The estimated costs are $3,150,000 and include planning, compliance, engineering, permitting, implementation, monitoring, maintenance, oversight, and contingency costs.

Figure 2-12 **NR3, Lower Suwannee River Watershed – Nutrient Reduction: General Project Location**

2.5.3 Project Descriptions: Water Quality

This RP/EA identifies 12 restoration alternatives consistent with the Restore Water Quality Restoration Goal (PDARP/PEIS Section 5.3.1) and underlying Water Quality Restoration Type (PDARP/PEIS Section 5.5.5):

1. Carpenter Creek Headwaters Water Quality Improvements (preferred);
2. Pensacola Beach Reclaimed Water System Expansion (preferred);
3. Rattlesnake Bluff Road and Riverbank Restoration (preferred);
4. Pensacola Bay Unpaved Roads Initiative (P&D; preferred);
5. Alligator Lake Coastal Dune Lake Hydrologic Restoration (preferred);
6. Grand Lagoon Regional Stormwater Facility;
7. St. Andrew Bay Unpaved Roads Initiative (P&D);
8. City of Port St. Joe Stormwater Improvements (preferred);
9. MK Ranch Hydrologic Restoration;
10. City of Carrabelle's Lighthouse Estates: Septic Tank Abatement - Phase II (preferred);
11. Lower Suwannee National Wildlife Refuge Hydrologic Restoration (P&D; preferred);
12. Lower Charlotte Harbor Flatwoods Hydrologic Restoration Initiative, Yucca Pens Unit (P&D; preferred).

A description of each of these restoration alternatives is provided below.

WQ1, Carpenter Creek Headwaters Water Quality Improvements (preferred)

Restoration Approach
Reduce pollution and hydrologic degradation to coastal watersheds (PDARP/PEIS 5.5.5)
Restoration Technique
Traditional stormwater control measures (PDARP/PEIS Sec. 5.D.2.2)
Project Location
Carpenter Creek, Bayou Texar, City of Pensacola, Escambia County, Florida (Figure 2-13)
Project Summary
The project would be implemented by the FDEP FL TIG Trustee in coordination with Escambia County. Other project partners include the City of Pensacola, Pensacola and Perdido Bays Estuary Program, Emerald CoastKeeper, UWF, Bayou Texar Foundation, UF Institute of Food and Agricultural Sciences (IFAS) Extension, Washington High School Marine Science Academy, Bream Fishermen Association, and the Audubon Society (Florida chapter). The project is a retrofit of existing stormwater management systems within the county designed to provide additional water treatment, and thereby improve water quality, in Carpenter Creek and Bayou Texar, which flow into Pensacola Bay. The project is a companion to a recreational project in this RP/EA (REC5, Carpenter Creek Headwater Park), both of which are part of the Carpenter Creek and Bayou Texar Watershed Management Plan (funded through Escambia County's RESTORE Direct Component project). When complete, the Watershed Management Plan would recommend and describe future priority restoration and public access needs in the watershed. Specifically, the project would include: • Restoration of a county-owned 2.6-acre former wetland; • Acquisition of land for construction of a stormwater treatment facility; • Construction of a stormwater treatment facility to capture and treat stormwater that flows off Olive Road into Carpenter Creek. The project area is within the jurisdiction of Escambia County, within the highly urbanized Carpenter Creek and Bayou Texar watershed. The Pensacola Bay Watershed Plan (2005) suggests the implementation of best management practices (BMPs) for the Carpenter Creek urban watershed, including restoration of the stream's natural sinuosity and public education efforts to help reduce pollutant loads. Both Carpenter Creek and Bayou Texar have been verified by FDEP as impaired for fecal coliform bacteria and TMDLs have been adopted for both water bodies. This project would improve water quality by collecting and treating stormwater and restoring wetland and upland habitat, helping the County address water quality impairments and comply with regulations governing their state-designated uses. Untreated stormwater currently discharges into Carpenter Creek. In 2017, Escambia County purchased the approximately 7-acre headwater parcel to prevent further encroachment within Carpenter Creek, improve water quality, and develop the first public access to the Creek. The project proposes acquiring the neighboring 6-acre parcel to the east for stormwater treatment and habitat restoration. A wet pond is proposed for west of Carpenter Creek that would treat stormwater coming off west Olive Road. The stormwater facility proposed east of Carpenter Creek would treat stormwater off east Olive Road by constructing a treatment train featuring a wet pond. The project would reduce pollutant loading and hydrologic degradation in the watershed and to coastal waters. The restored wetland would improve habitats and species that depend on wetland habitats, stabilize the soils, and reduce erosion and sediment loading into Carpenter Creek.

The project directly reduces pollution and hydrologic degradation to coastal wetlands by restoring wetlands and constructing a stormwater treatment facility that would reduce erosion as well as sediments, nutrients, and other pollutants associated with stormwater runoff, in watersheds injured by the DWH oil spill. Reducing pollutant loadings to Carpenter Creek would also benefit estuarine-dependent water column resources, oysters, and submerged aquatic vegetation (SAV) in Bayou Texar and Pensacola Bay.

Project Activities and Implementation Details

Project activities would include land acquisition, planning, design, construction of stormwater improvements and wetland/floodplain restoration, post-construction storm event monitoring, and wetlands/floodplain aquatic vegetation monitoring.

The project would be completed in approximately three years. Planning and design is anticipated during the first 12 months, followed by pre-construction monitoring for six months, and construction activities over 24 months in Years 2 and 3.

Maintenance

Revegetation of areas disturbed by construction activities would require short-term repair and maintenance. Long-term maintenance would be required for stormwater treatment facilities, including berms and water control structures and invasive plant control within the water storage area and wetlands/floodplain restoration area.

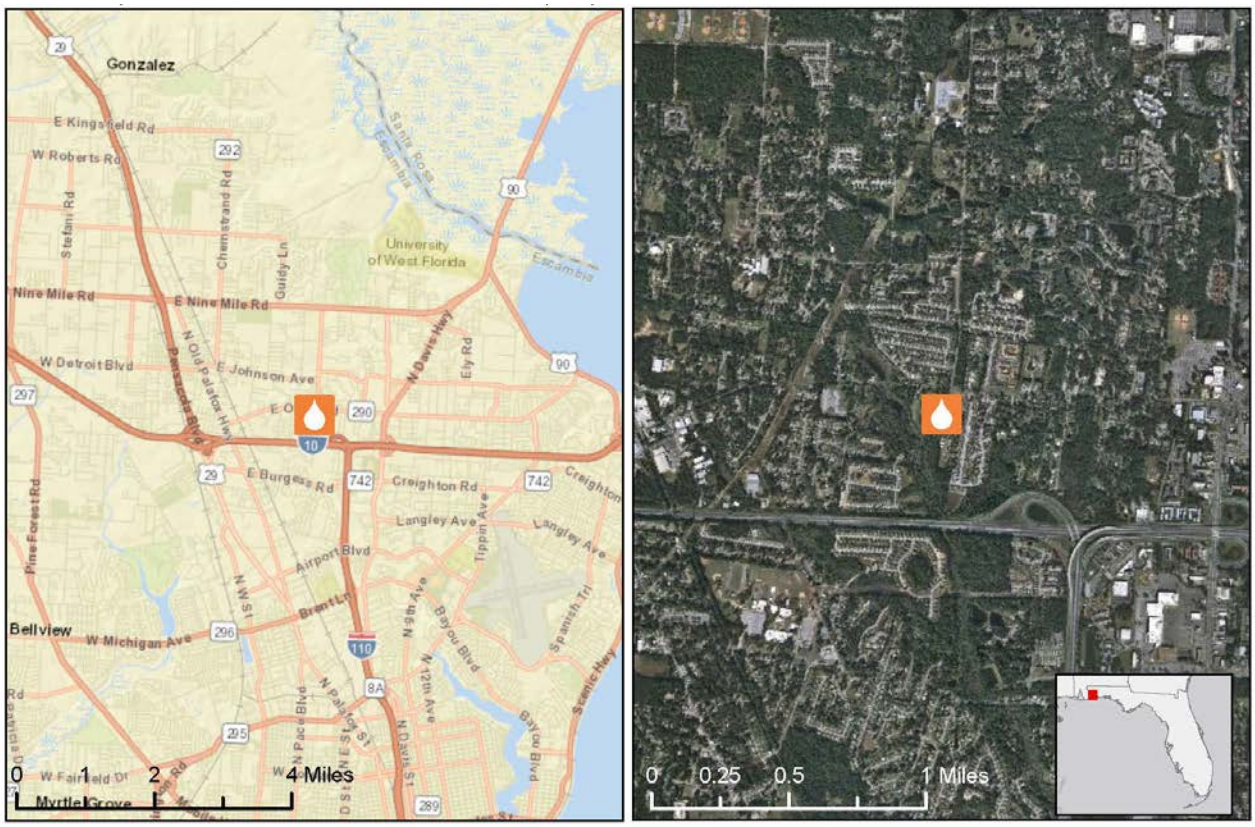
Project Monitoring

Project monitoring details are provided in the project MAM plan found in Appendix B.

Costs

The estimated costs are $1,689,900 and include planning, design, construction, monitoring, Trustee and local sponsor oversight, and administration.

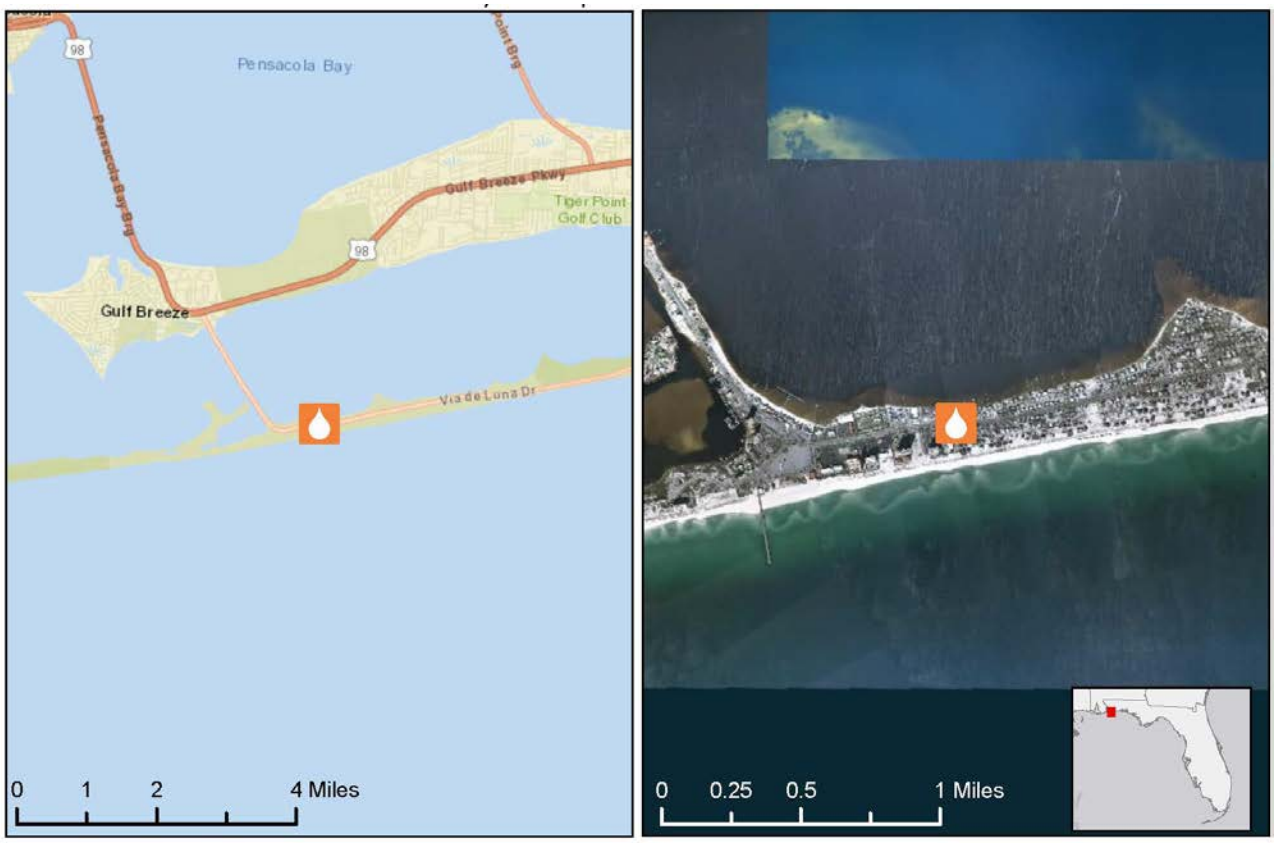
Figure 2-13 WQ1, Carpenter Creek Headwaters Water Quality Improvements: General Project Location



WQ2, Pensacola Beach Reclaimed Water System Expansion (preferred)

Restoration Approach
Reduce pollution and hydrologic degradation to coastal watersheds (PDARP/PEIS 5.5.5)
Restoration Technique
Expand reclaimed water system
Project Location
Pensacola Beach, Escambia County (Figure 2-14)
Project Summary
The project would be implemented by the FDEP FL TIG Trustee in coordination with the Emerald Coast Utilities Authority (ECUA) and NWFWMD. The project aims to reduce the discharge of nutrients and other pollutants into Santa Rosa Sound by expanding the ECUA's Pensacola Beach Reclaimed Water System. This project includes making additional reclaimed water available to the Santa Rosa Island Authority for irrigation of more public rights-of-way and making reclaimed water available for irrigation of commercial and residential areas on Santa Rosa Island. Specifically, the project would include: • Implementing Phases I-IV of ECUA's Reclaimed Water Plan, which includes constructing pumping facilities, reuse transmission, and distribution lines; The project would directly improve water quality in watersheds injured by the DWH oil spill. Ecological benefits include reduced nutrient loading to Santa Rosa Sound and conservation of potable water and reduced demand on the Sand-and-Gravel aquifer, ECUA's drinking water source. Implementation of Phases I-IV of the ECUA Reclaimed Water Plan would result in a reuse potential of 0.94 mgd. Combining the current reuse of approximately 120,000 gallons per day with this project would lead to a reduction in approximately 8,500 pounds of annual nitrogen (at permit discharge limits), 2,850 pounds of phosphorus, and 14,000 pounds per year of total suspended solids. The improvement in water quality due to reduced wastewater discharge to surface waters is expected to improve and expand SAV. Further, fertilizer use on Santa Rosa Island may be reduced because of the nutrients available in reclaimed water.
Project Activities and Implementation Details
Project activities include implementation and administrative oversight. The project would be implemented over approximately three years. The timeline for commencement and completion of the project includes approximately 36 months for planning and construction activities (to be phased to avoid tourist seasons on Pensacola Beach).
Maintenance
Short-term maintenance activities include revegetation of areas disturbed by construction activities. Long-term maintenance activities include routine maintenance of reclaimed water lines, meters, valves, etc.
Project Monitoring
Project monitoring details are provided in the project MAM plan found in Appendix B.
Costs
The estimated project costs, funded through NRDA, are $4,683,404, which includes implementation of Phases I through IV, oversight, and contingency costs. The total project construction costs are estimated at $9,100,000. The remainder of the construction funding, as well as engineering and administration funding would be provided by the NWFWMD ($947,000) and ECUA ($1,821,160).

Figure 2-14 WQ2, Pensacola Beach Reclaimed Water System Expansion: General Project Location

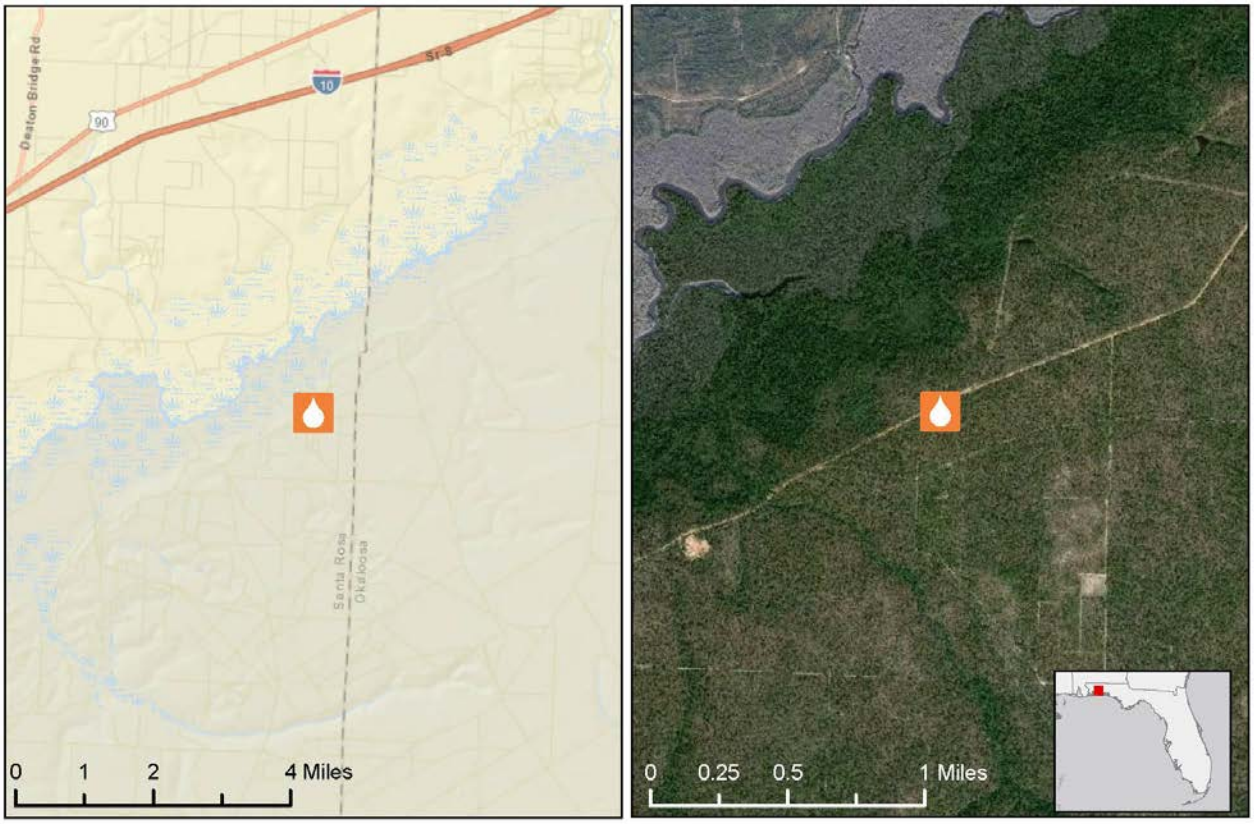


WQ3, Rattlesnake Bluff Road and Riverbank Restoration (preferred)

Restoration Approach
Reduce pollution and hydrologic degradation to coastal watersheds (PDARP/PEIS 5.5.5)
Restoration Technique
Erosion and sediment control practices (PDARP/PEIS Appendix 5.D.2.2)
Project Location
Rattlesnake Bluff Road, Santa Rosa and Okaloosa counties, Florida (Figure 2-15)
Project Summary
The project would be implemented by the DOI FL TIG Trustee in coordination with FDEP, USFWS, U.S. Department of Defense, Eglin Air Force Base, FWC, The Nature Conservancy (TNC), Santa Rosa County and Okaloosa County. The project would reduce erosion and sediment loads to the Yellow River and Pensacola Bay by stabilizing roads and replacing deteriorating and/or inadequate culverts at up to six priority stream crossings identified along Rattlesnake Bluff Road in Santa Rosa and Okaloosa counties. Specifically, the project would include: • Re-assessment and selection of six from the existing 13 priority stream crossings along Rattlesnake Bluff Road; • Planning, design, and construction of culvert replacement and associated bank and road stabilization; • Water quality monitoring to evaluate reductions in sedimentation. Pensacola Bay and the Yellow River are designated priority waterbodies in Florida. However, excessive sedimentation resulting from riverbank instability, unpaved road crossings, and undersized culverts are believed to be the primary factors causing degradation of river habitat and biological communities in the watershed and Pensacola Bay. The project would mitigate the negative impacts of excessive sedimentation to water quality, habitats, and ecological resources of the Yellow River basin along Rattlesnake Bluff Road at 4-6 priority impaired sites/stream crossings. These activities would maximize a reduction in excessive sedimentation and increase the potential to restore priority ecological resources. The project would directly reduce pollution and hydrologic degradation to coastal wetlands by installing erosion and sediment controls in watersheds injured by the DWH oil spill. The project improves water quality by mitigating the impacts of excessive sedimentation to the Yellow River and Pensacola Bay at 4-6 priority stream crossings in Okaloosa and Santa Rosa counties. Reducing sedimentation would improve water quality, benefit estuarine-dependent water column resources, oysters, and SAV, and mitigate chronic ecosystem threats such as habitat degradation and impacts to recreational use.
Project Activities and Implementation Details
Project activities include re-assessment of the 13 priority stream crossings to select up to six sites (Phase I), P&D (Phase II), construction (i.e., culvert replacement, bank stabilization, and road stabilization) (Phase III), one year of restoration success monitoring (i.e., reduction in sedimentation) based on comparison of before/after data collection and development of adaptive management strategies if data project objectives have not been met (Phase IV). The project would be completed in approximately two years.
Maintenance
Inspection and maintenance of installed culverts in the short- and long-term to ensure proper function.
Project Monitoring
Project monitoring details are provided in the project MAM plan found in Appendix B.

Costs
The estimated costs are $3,149,091 and include planning, design, construction, operation and maintenance, monitoring, oversight, and contingency costs.

Figure 2-15 WQ3, Rattlesnake Bluff Road and Riverbank Restoration: General Project Location



WQ4, Pensacola Bay Unpaved Roads Initiative (P&D) (preferred)

Restoration Approach
Reduce pollution and hydrologic degradation to coastal watersheds (PDARP/PEIS 5.5.5)
Restoration Technique
Erosion and sediment control practices (PDARP/PEIS Appendix 5.D.2.2)
Project Location
Escambia, Santa Rosa, and Okaloosa Counties, Florida (Figure 2-16)
Project Summary
The project would be implemented by the FDEP FL TIG Trustee in coordination with the USFWS, NWFWMD, Escambia County, Santa Rosa County, and Okaloosa County. The project aims to collect information that would be helpful to improving water quality in the Pensacola Bay watershed. The project would include assessing and identifying unpaved stream crossings contributing the largest sediment loads to the watershed, and to develop 30% design plans of site-specific solutions at a minimum of 15 priority locations to eliminate or reduce sediment loading to water resources and associated habitat. The 15 locations would be the highest prioritized sites based on a larger number of sites assessed. This project would build on work completed through a GEBF project: Water Quality Improvements to Enhance Fisheries Habitat in the Lower Choctawhatchee River Basin – Phase I. Specifically, the project would include: • Compilation and inventory of unpaved roads, stream crossings, and proximity sites in the Pensacola Bay watershed; • Evaluation and modeling of unpaved roads including geodatabase/GIS development; • Preliminary prioritization of sites where unpaved roads are negatively affecting the Pensacola Bay watershed using the USFWS Sediment Risk Index (SRI); • Sediment transport modeling; • Monitoring and field reconnaissance; • Development of 30% design plans and final prioritization of sites. In 2007, the Northwest Florida County-Maintained Unpaved Road-Stream Crossings Inventory was conducted by USFWS, which identified unpaved, county-maintained roads in 16 northwest Florida counties, totaling 2,777 unpaved road stream crossings. Results showed that Pensacola Bay has the second largest number of unpaved, county-maintained roads in northwest Florida, with over 300 unpaved road sites. The project would build on this inventory to identify priority road crossings for future restoration activities to reduce sediment loading into the Pensacola Bay river systems. A range of practices can be used to minimize erosion and the transport of sediment downstream. USDA-NRCS uses various techniques to reduce erosion and soil loss from farms (e.g., sediment basins, vegetative buffers, and/or terracing). In addition, Florida's Stormwater Erosion and Sediment Control Inspector's Manual provides BMPs for other land uses and activities (FDEP 2008). In certain regions of Florida, unpaved roads exposed to torrential rainfall can cause significant erosion and result in sediment loadings to nearshore water bodies. Erosion-sediment control practices for unpaved roads might entail paving the unpaved road from hill crest to hill crest, using less erosive aggregate material, raising the road profile, installing grade breaks, incorporating additional drainage outlets, and/or removing roadside ditches and replacing them with vegetated swales. The project would improve water quality and habitats in the Pensacola Bay watershed by assessing and identifying unpaved stream crossings contributing the most amount of sediment to the watershed. Unpaved roads cause significant erosion and sediment loading to nearshore water bodies (PDARP/PEIS Sec.

5.D.2.2). While road systems typically occupy a relatively small portion of the landscape, their construction and maintenance have a great impact on water quality in the adjacent streams and the connected, downstream aquatic ecosystems (Gucinski et al. 2001) causing loss of habitat and aquatic species decline. It has been well documented that stream-bound sediment interferes with the downstream growth and development of algae, phytoplankton, and SAV by absorbing or scattering solar radiation necessary for photosynthesis.

The 2017 NWFWMD Pensacola Bay System SWIM plan identifies unpaved roads as one of the challenges in the watershed contributing to nonpoint source pollution, turbidity in streams, smothering habitats and impacting water quality and the physical structure of the waterbodies. The project would inventory unpaved road stream-crossings, prioritize sites, and develop solutions to mitigate these adverse effects of unpaved roads (i.e., sedimentation in streams) in the Pensacola Bay watershed by reducing sediment loading.

Project Activities and Implementation Details

Project activities include compiling and inventorying unpaved roads, stream crossings, and proximity sites; GIS development; prioritization of sites; monitoring; modeling; field reconnaissance; and development of 30% designs.

The timeline for commencement and completion of the project includes:

- Compile and inventory unpaved roads, stream crossings, and proximity sites – 3 months
- Geodatabase/GIS development – 4 months
- Preliminary prioritization of sites – 6 months
- Monitoring – 9 months
- Modeling – 1 year
- Field reconnaissance – 1.5 years
- Final prioritization of sites – 2 years
- 30% design – 2.5 years

Maintenance

None anticipated (planning initiative).

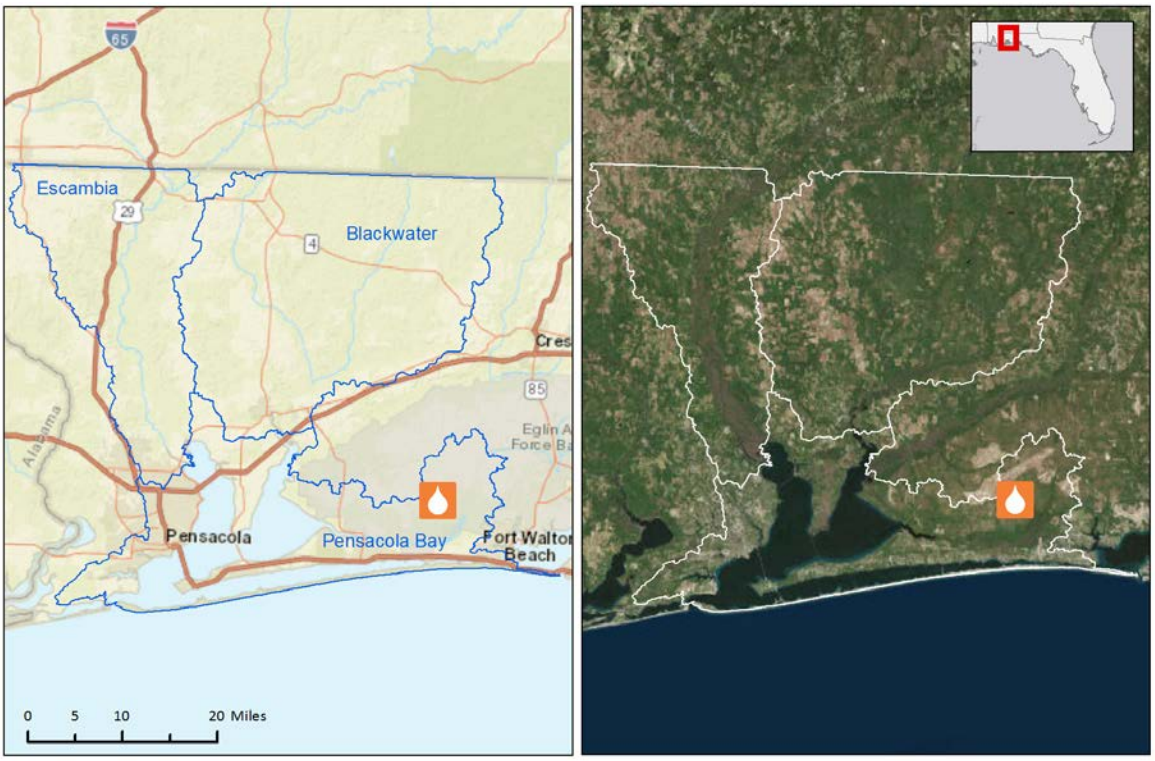
Project Monitoring

Consistent with Section 10 of the Trustee SOPs, a MAM plan is not required for projects with only P&D activities, and therefore a MAM plan for this project has not been developed.

Costs

The estimated costs are $705,473 and include P&D, evaluation, modeling, monitoring, field reconnaissance, and oversight and management costs.

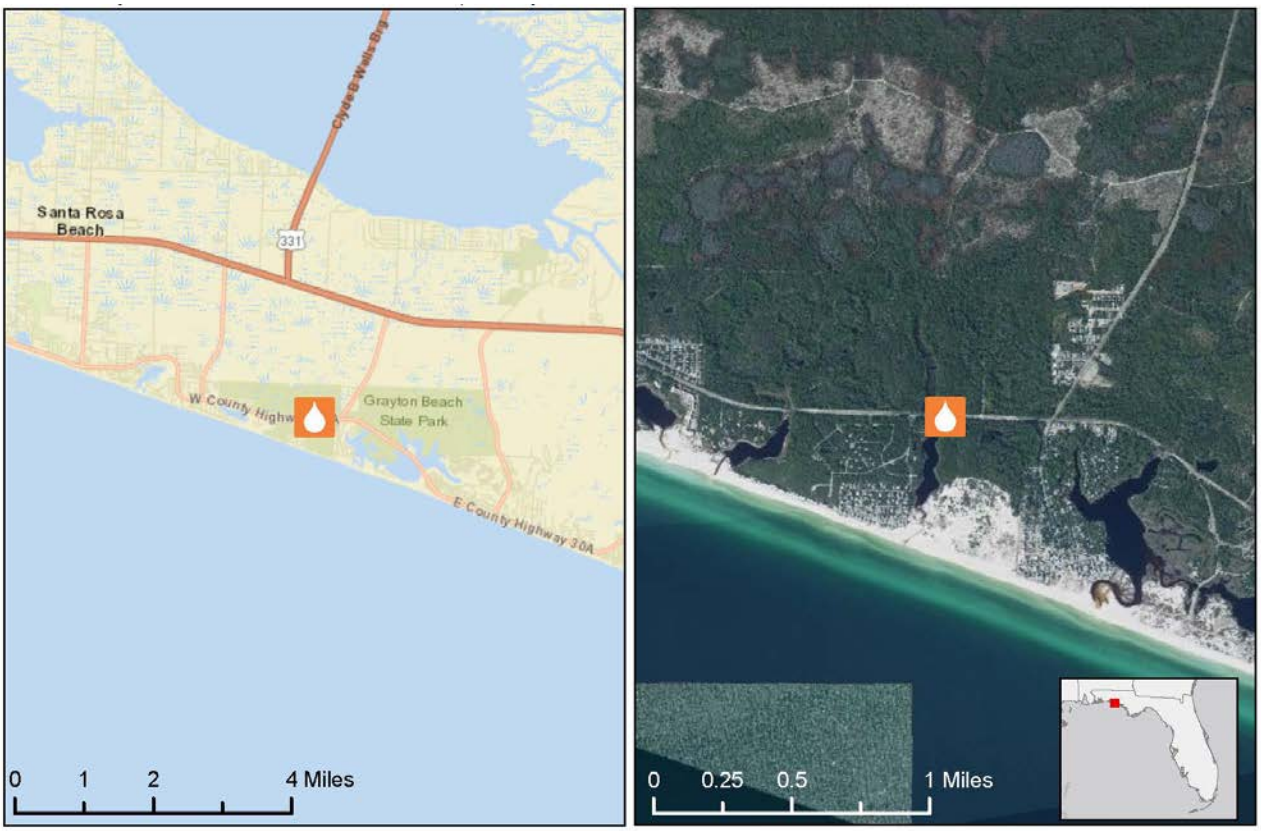
Figure 2-16 WQ4, Pensacola Bay Unpaved Roads Initiative (P&D): General Project Location



WQ5, Alligator Lake Coastal Dune Lake Hydrologic Restoration (preferred)

Restoration Approach
Protect and conserve marine, coastal, estuarine, and riparian habitats (PDARP/PEIS 5.5.5)
Restoration Technique
Restore hydrologic connections to enhance coastal habitats (PDARP/PEIS Appendix 5.D.1.1)
Project Location
Walton County, Florida (Figure 2-17)
Project Summary
The project would be implemented by the FDEP FL TIG Trustee in coordination with the Walton County Board of County Commissioners. The project would reduce pollution and hydrologic degradation to coastal waters within the Choctawhatchee Bay Watershed by removing culverts under County Road 30A that are deteriorating and/or in disrepair, presently acting as barriers separating the north and south portions of Alligator Lake rather than allowing the exchange of fresh and Gulf waters. The culverts act as barriers to fish and wildlife and reduce water and sediment exchange. A bridge would be constructed across Alligator Lake to help restore tidal exchange and remove barriers to fish and wildlife movements. This project would build on work completed through a GEBF project: Restoration of Florida's Coastal Dune Lakes. Specifically, the project would include: • Construction of a spanning bridge across Alligator Lake to replace culverts that are deteriorating and/or in disrepair; • Continued water quality sampling under an existing monitoring program. The project would help restore the connection and circulation of the lake and improve the lake community and adjacent ecosystems, improve water quality in the lake, and enhance fish and wildlife habitat. The project would directly improve water quality in watersheds injured by the DWH oil spill by restoring hydrologic connections between the coastal and freshwater portions of Alligator Lake and enhancing coastal habitats. By replacing culverts in disrepair with a bridge, hydrologic connectivity would be restored, resulting in improved water quality, water flows, and subsequent benefits to fish and wildlife. The project would develop and implement management actions to improve water quality in Alligator Lake and the Choctawhatchee Bay watershed by removing physical barriers from the lake. Long-term benefits to the resources and their services injured by the spill would include improved health and resilience of coastal and marine habitats and resources.
Project Activities and Implementation Details
Project activities include construction engineering and inspection, removal of deteriorating culverts under CR 30A, construction of a spanned bridge along CR 30A over Alligator Lake, and pre- and post-water quality monitoring under existing programs. The project would be implemented over approximately ten months.
Maintenance
Post-construction inspection and maintenance of the bridge to ensure proper function and safety.
Project Monitoring
Project monitoring details are provided in the project MAM plan found in Appendix B.
Costs
The estimated costs are $1,382,400 and include construction oversight, construction, monitoring, and administrative oversight.

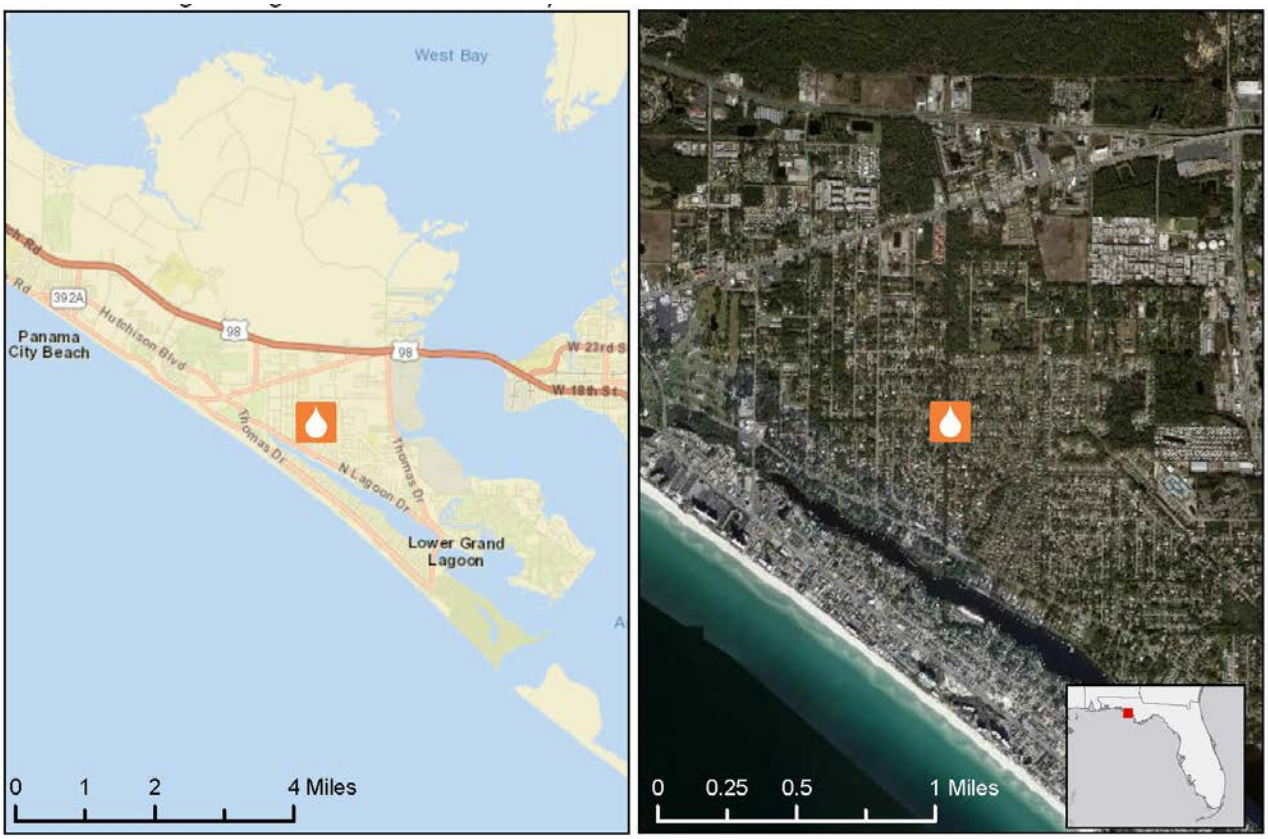
Figure 2-17 **WQ5, Alligator Lake Coastal Dune Lake Hydrologic Restoration: General Project Location**



WQ6, Grand Lagoon Regional Stormwater Improvements

Restoration Approach
Reduce pollution and hydrologic degradation to coastal watersheds (PDARP/PEIS 5.5.5)
Restoration Technique
Traditional stormwater control measures (PDARP/PEIS Appendix 5.D.2.2)
Project Location
Panama City Beach area, Bay County, Florida (Figure 2-18)
Project Summary
The project would be implemented by the FDEP FL TIG Trustee in coordination with the City of Panama City Beach and NWFWMD. The project aims to improve water quality near Grand Lagoon, which is near Panama City Beach, by retrofitting existing stormwater management systems. The project would reduce pollution in coastal watersheds to improve local water quality. Specifically, the project would include: • Development of a 20-acre stormwater treatment facility that serves a 350-acre basin; • Construction of a main retention pond with a forebay used for sediment control and debris removal and a main pond for the stormwater runoff; • Combining the efforts of the existing septic to sewer project in this area with the proposed stormwater treatment facility to reduce excess nutrients from flowing into Grand Lagoon. The project would directly improve water quality in watersheds injured by the DWH oil spill by reducing point and nonpoint source pollution into Grand Lagoon, which is part of the St. Andrew Bay watershed, which has a direct connection to the Gulf of Mexico. Bay County has identified the upper Grand Lagoon area as one of the highest priority areas in the county in need of stormwater facilities. The lagoon opens to and is immediately west of the St. Andrews Aquatic Preserve.
Project Activities and Implementation Details
Project activities include planning, design, and permitting of stormwater improvements, construction of stormwater improvements, and post-construction storm event monitoring. The timeline for commencement and completion of the project includes: • Land acquisition – 12 months • Planning, design and permitting – 12 months • Construction – 24 months • Post-construction storm event monitoring – 12 months
Maintenance
Short-term maintenance activities include revegetation of areas disturbed by construction activities. Long-term maintenance activities include maintenance of stormwater treatment facilities, including berms and water control structures and invasive plant control within the water storage area.
Project Monitoring
This project has not been identified as a preferred alternative by the FL TIG at this time, and therefore a project MAM plan has not been developed.
Costs
The estimated costs are $3,210,910 and include planning, design, construction, monitoring, and administrative oversight. Bay County would fund the acquisition of the parcel where the stormwater facility would be located.

Figure 2-18 WQ6, Grand Lagoon Regional Stormwater Improvements: General Project Location

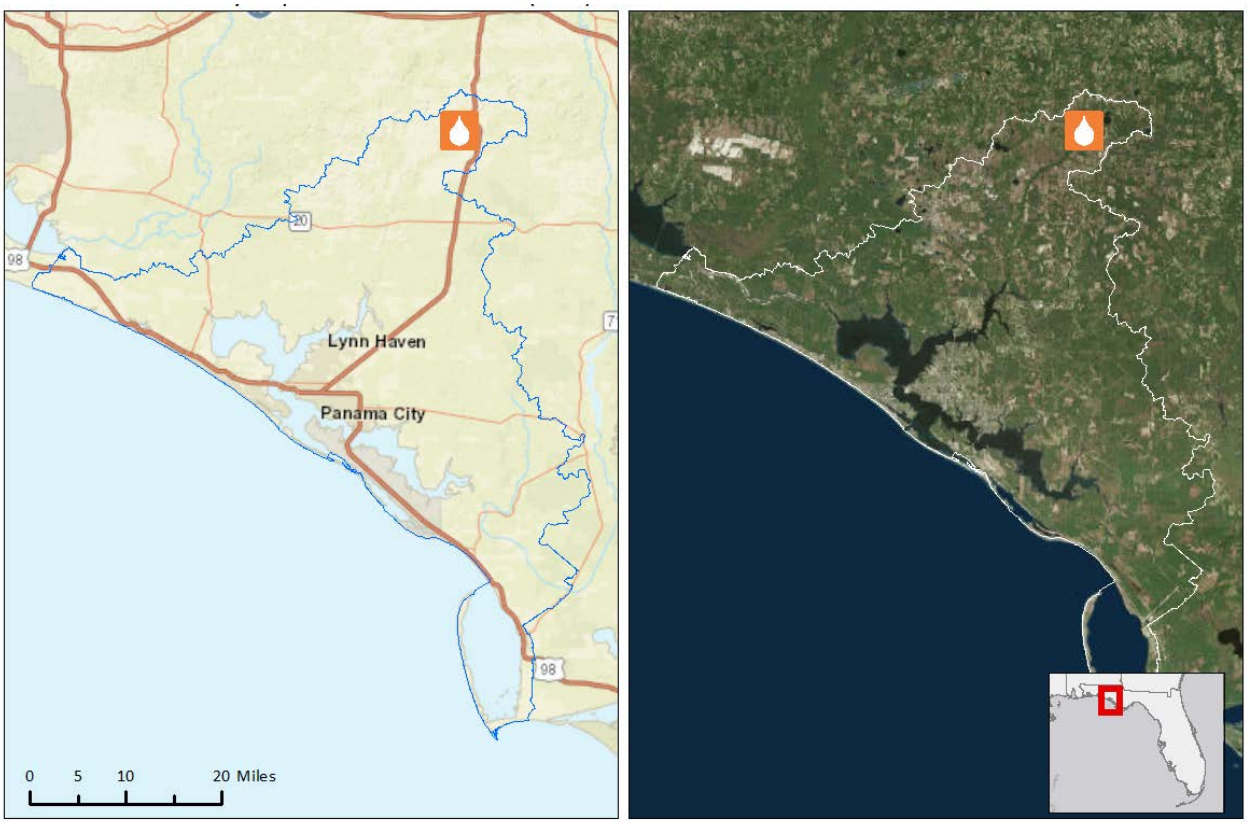


WQ7, St. Andrew Bay Unpaved Roads Initiative (P&D)

Restoration Approach
Reduce pollution and hydrologic degradation to coastal watersheds (PDARP/PEIS 5.5.5)
Restoration Technique
Erosion and sediment control practices (PDARP/PEIS Appendix 5.D.2.2)
Project Location
Bay County (Figure 2-19)
Project Summary
The project would be implemented by the FDEP FL TIG Trustee in coordination with the USFWS and the NWFWMD. This project aims to collect information that would be helpful to improving water quality in the St. Andrew Bay watershed. The project would include assessing and identifying unpaved stream crossings contributing the largest sediment loads to the watershed, and to develop 30% design plans of site-specific solutions at a minimum of 15 priority locations to eliminate or reduce sediment loading to water resources and associated habitat. The 15 locations would be the highest-prioritized sites based on a larger number of sites assessed. This project would build on work completed through a GEBF project: Water Quality Improvements to Enhance Fisheries Habitat in the Lower Choctawhatchee River Basin – Phase I. Specifically, the project would include: • Compilation and inventory of unpaved roads, stream crossings, and proximity sites; • Evaluation and modeling of unpaved roads including geodatabase/GIS development; • Preliminary prioritization of sites where unpaved roads are negatively affecting the watershed using the USFWS SRI; • Modeling; • Monitoring and field reconnaissance; • Development of 30% design plans and final prioritization of sites. Results from the inventory discussed in the WQ4, Pensacola Bay Unpaved Roads Initiative project ranked the northwest Florida watersheds in priority order as: Choctawhatchee, Pensacola, Apalachicola, St. Andrew/St. Joseph, Ochlockonee/Apalachee and Perdido. The project would build on this inventory to identify priority road crossings for future restoration activities to reduce sediment loading into the St. Andrew Bay watershed. For additional information on the project, see the project description for WQ4.
Project Activities and Implementation Details
Project activities include compiling and inventorying unpaved roads, stream crossings, and proximity sites; GIS development; prioritization of sites; monitoring; modeling; field reconnaissance; and development of 30% designs. The timeline for commencement and completion of the project includes: • Compile and inventory unpaved roads, stream crossings, and proximity sites – 3 months • Geodatabase/GIS development – 4 months • Preliminary prioritization of sites – 6 months • Monitoring – 9 months • Sediment transport modeling – 1 year • Field reconnaissance – 1.5 years • Final prioritization of sites – 2 years • 30% design – 2.5 years

Maintenance
None anticipated.
Project Monitoring
Consistent with Section 10 of the Trustee SOPs, a MAM plan is not required for projects with only P&D activities, and therefore a MAM plan for this project has not been developed.
Costs
The estimated costs are $705,473 and include P&D, evaluation, modeling, monitoring, field reconnaissance, and oversight and management costs.

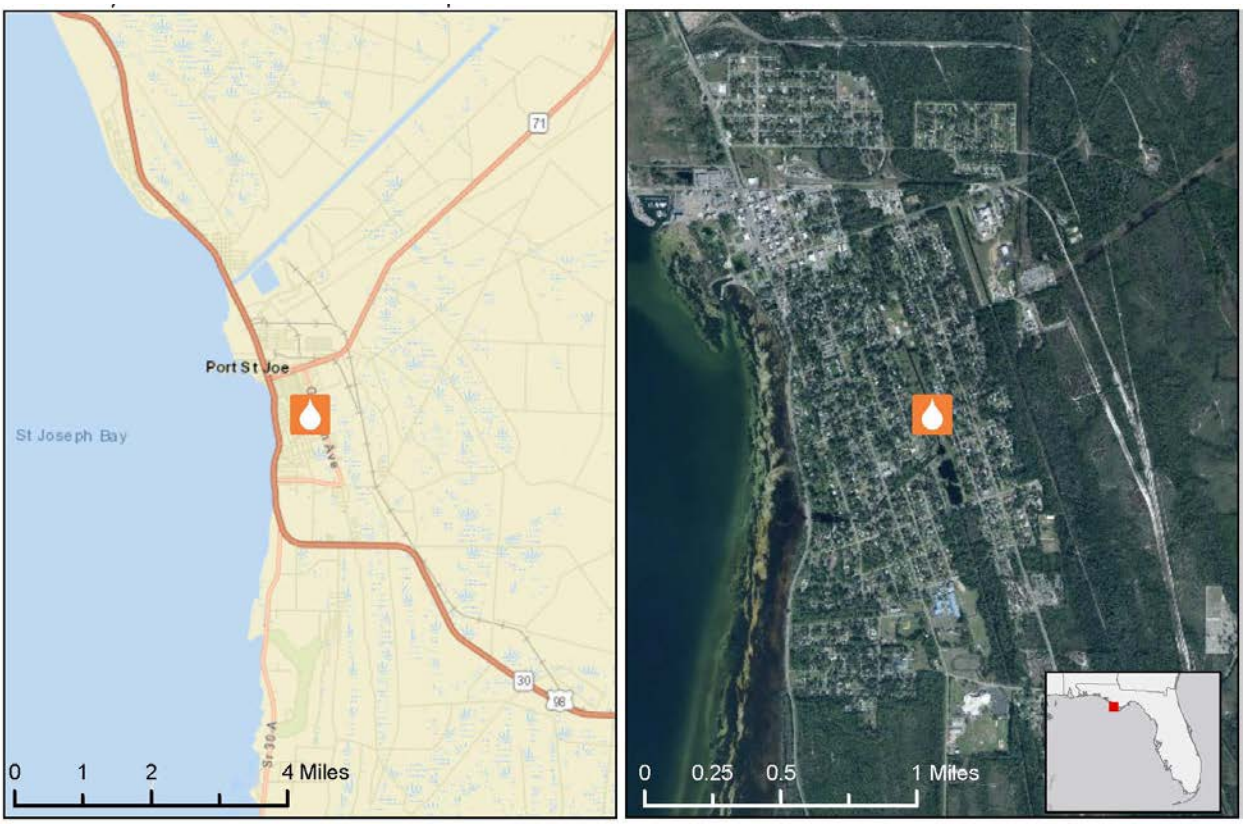
Figure 2-19 WQ7, St. Andrew Bay Unpaved Roads Initiative (P&D): General Project Location



WQ8, City of Port St. Joe Stormwater Improvements (preferred)

Restoration Approach
Reduce pollution and hydrologic degradation to coastal watersheds (PDARP/PEIS 5.5.5)
Restoration Technique
Traditional stormwater control measures (PDARP/PEIS Sec. 5.D.2.2)
Project Location
City of Port St. Joe, Gulf County, Florida (Figure 2-20)
Project Summary
The project would be implemented by the FDEP FL TIG Trustee in coordination with the NWFWMD and the City of Port St. Joe. The proposed stormwater improvements include traditional stormwater control measures (SCMs) and development of a stormwater master plan. SCMs are planned for a sub-basin covering approximately 280 acres draining to Patton Bayou and St. Joseph Bay. The project would include construction of approximately 2.5 acres of retrofit treatment pond area near 16th Street with an additional downstream outfall weir added to provide stormwater treatment capacity and improved water quality protection for St. Joseph Bay. Additional work includes improvement of the conveyance system, for enhanced stormwater management and improved treatment efficiency. The stormwater master plan would provide an evaluation of the city's current stormwater systems through data collection, mapping, watershed delineation, preparation of a stormwater features inventory, development of proposed improvements, and prioritization of watersheds. The plan would allow the city to better address local flooding and to improve water quality treatment within basins that discharge into St. Joseph Bay. Treating stormwater before it enters St. Joseph Bay, a designated Outstanding Florida Water Body, would reduce pollutant loading to an important resource for shellfish and other fisheries and public recreation and help to improve water quality in the bay, which is identified as impaired for nutrients (e.g., total nitrogen) and bacteria on the impaired waters list established by FDEP. Specifically, the project would include: • Construction of SCMs and treatment pond and improvements of existing conveyance system; • Development of a stormwater master plan for the City of Port St. Joe; • Water quality monitoring. The project would directly improve water quality in watersheds injured by the DWH oil spill by capturing and treating stormwater runoff prior to discharge into St. Joseph Bay, which has sensitive and regionally significant SAV that underpin the greater aquatic ecosystem and support important recreational and commercial fisheries.
Project Activities and Implementation Details
Project activities include development of a stormwater master plan, P&D, construction of stormwater improvements, and post-construction storm event monitoring. The project would be implemented over approximately two years, with construction activities taking approximately 18 months.
Maintenance
Revegetation of areas disturbed by construction activities would require short-term repair and maintenance. Long-term maintenance would be required for stormwater treatment facilities, including berms and water control structures and invasive plant control within the water storage area and wetlands/floodplain restoration area.
Project Monitoring
Project monitoring details are provided in the project MAM plan found in Appendix B.
Costs
The estimated costs are $961,000 and include planning, design, construction, monitoring, and administration.

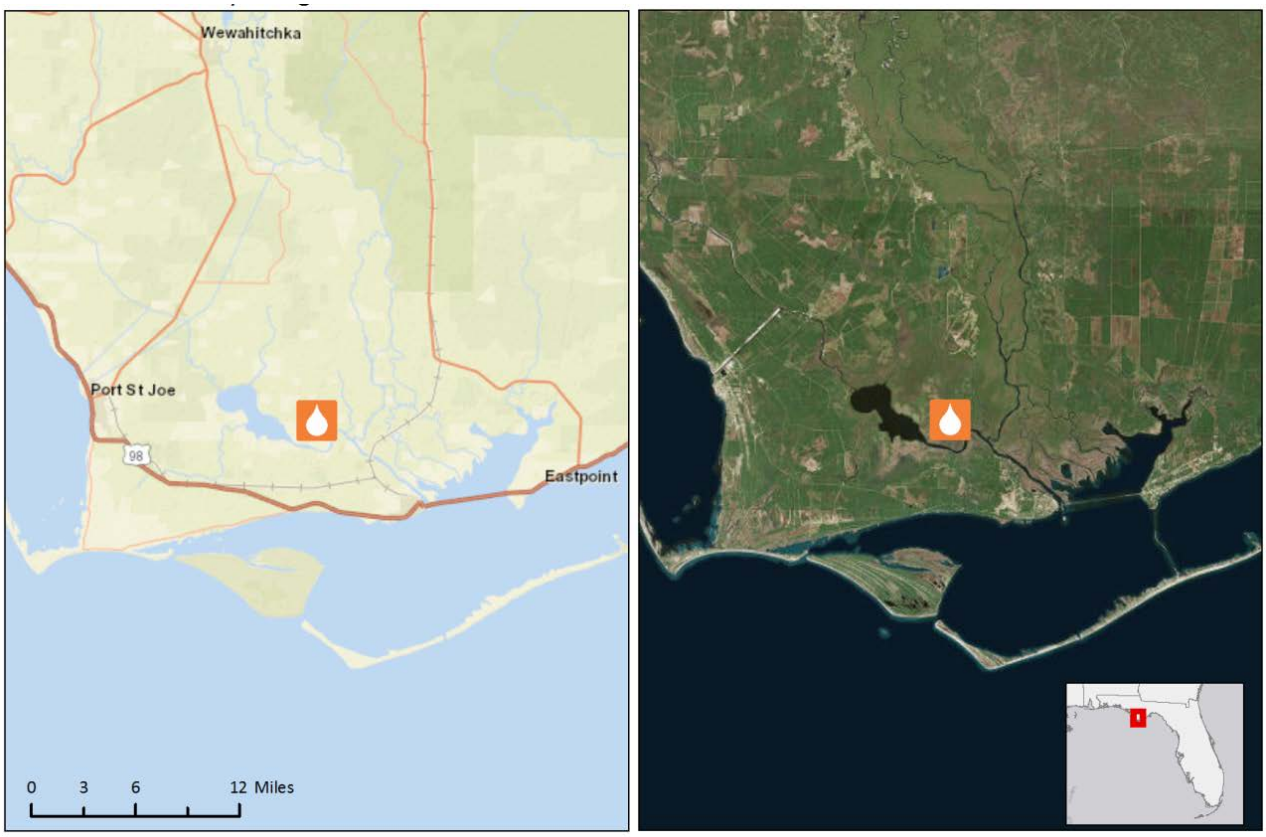
Figure 2-20 WQ8, City of Port St. Joe Stormwater Improvements: General Project Location



WQ9, MK Ranch Hydrologic Restoration

Restoration Approach
Create, restore, and enhance coastal wetlands (PDARP/PEIS 5.5.5)
Restoration Technique
Restore hydrological connections to enhance coastal habitats (PDARP/PEIS Appendix 5.D.1.1)
Project Location
MK Ranch, located between Lake Wimico and the Apalachicola River, north of the Jackson River, in the Apalachicola River Wildlife and Environmental Area (Figure 2-21)
Project Summary
The project would be implemented by the FWC FL TIG Trustee and potentially in coordination with Ducks Unlimited to facilitate and oversee design and construction. The project aims to restore and improve water quality within the Saul Creek Basin in Apalachicola River Wildlife and Environmental Area (ARWEA), which discharges directly into Jackson River, which feeds Apalachicola Bay and Lake Wimico. Specifically, the project would include: • Restoration of 6,409 acres of historic wetland structure and function of creek drainages, wetlands, and tidal marsh by reconnecting natural drainage pathways; • Hydrologic restoration that could include hardened low-water crossings, ditch plugs, back filling ditches using material from existing berms, and culverts; • Collection of hydrologic and vegetative data (including invasive species) to monitor success. The project would directly improve water quality in watersheds injured by the DWH oil spill and restore historic wetland structure and function by reconnecting the natural drainage pathways within the watershed. This would in turn help to restore a portion of the historic flow regime to the estuary and help improve habitat conditions in stream and wetland habitats of ARWEA and Apalachicola Bay.
Project Activities and Implementation Details
Project activities include P&D, construction, and post-construction monitoring (hydrologic and vegetative). The project would be implemented over approximately two to three years. Planning and design would occur in Year 1. Construction activities would take place in Years 2 and 3 and take approximately 12-15 months.
Maintenance
None anticipated.
Project Monitoring
This project has not been identified as a preferred alternative by the FL TIG at this time, and therefore a project MAM plan has not been developed.
Costs
The estimated costs are $27,484,932 and include planning, design, implementation, monitoring, and administrative oversight. Engineering costs have not been completed as full restoration of the MK Ranch site would be contingent upon acquisition of the Lake Wimico parcel west of ARWEA.

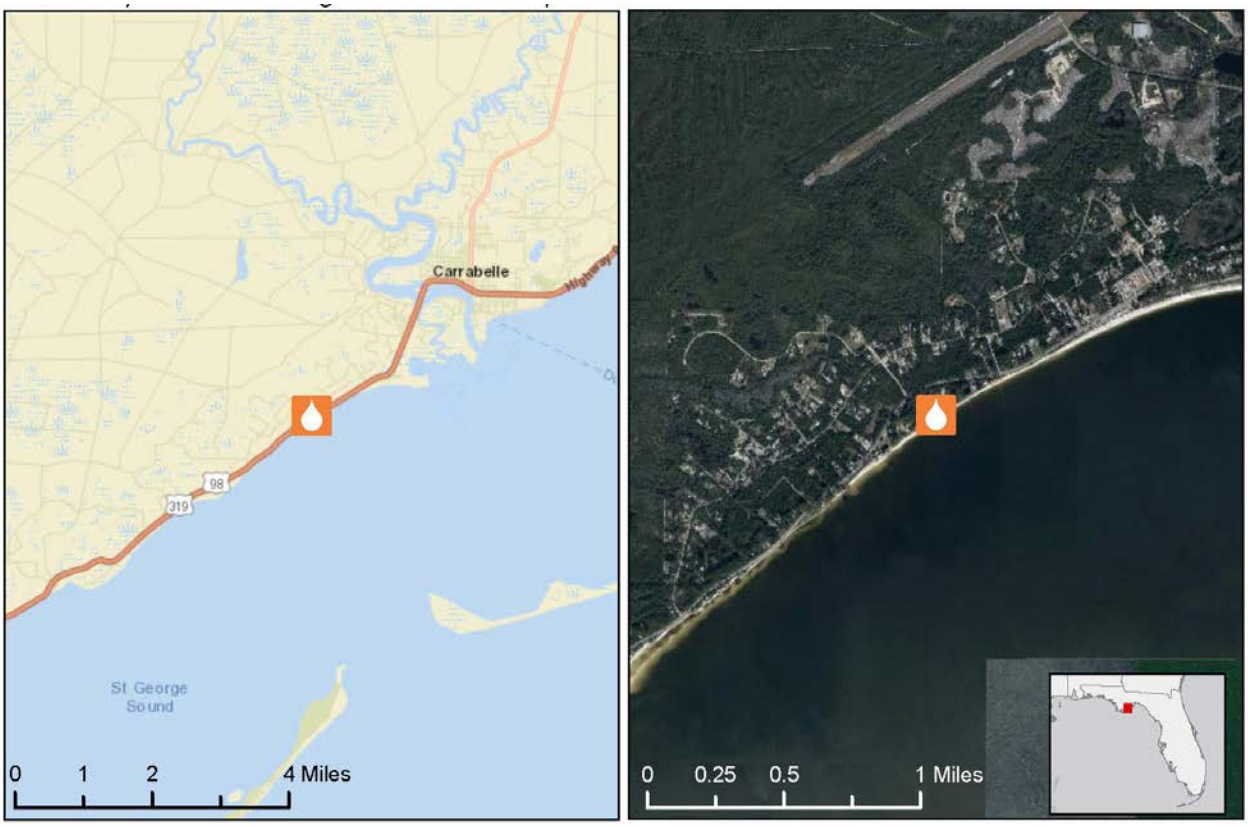
Figure 2-21 WQ9, MK Ranch Hydrologic Restoration: General Project Location



WQ10, City of Carrabelle's Lighthouse Estates: Septic Tank Abatement - Phase II (preferred)

Restoration Approach
Reduce pollution and hydrologic degradation to coastal watersheds (PDARP/PEIS 5.5.5)
Restoration Technique
Remove septic tanks and expand sanitary sewer system
Project Location
Southwest of the City of Carrabelle, Franklin County (Figure 2-22)
Project Summary
The project would be implemented by the FDEP FL TIG Trustee in coordination with the City of Carrabelle and NWFWMD. The project aims to improve water quality in Apalachicola Bay and St. George Sound by connecting homes near the bay currently served by septic systems to a central wastewater treatment system. Specifically, the project would include: • Connection of an additional 110 septic systems to the City of Carrabelle's wastewater treatment plant in addition to the 53 connections funded by the NWFWMD; • Limiting the installation of additional septic systems within the Lighthouse Estates area; • Comparing three years of pre-construction water quality monitoring to three years of post-construction water quality monitoring (i.e., *Enterococci* sp.). The project would directly improve water quality in watersheds injured by the DWH oil spill by reducing the discharge pollutant loading that otherwise would impact the health and quality of estuarine habitats in receiving waters. The project would also help to reduce the potential for beach closures, restrictions on shellfish harvesting, and human health impacts from microbial pathogens. Additionally, nitrogen loading to Apalachicola Bay from the Lighthouse Estates area would be reduced by approximately 3,000 pounds per year due to the significantly improved water quality treatment achieved by the city's wastewater plant as compared with that provided by the individual septic systems.
Project Activities and Implementation Details
Project activities include planning, design, implementation, and administrative oversight. The timeline for commencement and completion of the project includes: • Planning and design – 9 months • Construction – 12 months
Maintenance
Short-term maintenance activities include erosion control and revegetation of areas disturbed by construction activities. Long-term maintenance activities include maintenance and possible rehabilitation of domestic wastewater collection facilities and lift station to address infiltration or exfiltration issues.
Project Monitoring
Project monitoring details are provided in the project MAM plan found in Appendix B.
Costs
The estimated costs for Phase II are $3,237,986 and include planning, design, construction, and administrative oversight. Phase I will be funded by the NWFWMD ($851,000). The total for both phases is $4,088,986.

Figure 2-22 WQ10, City of Carrabelle's Lighthouse Estates: Septic Tank Abatement - Phase II: General Project Location



WQ11, Lower Suwannee National Wildlife Refuge Hydrologic Restoration (P&D) (preferred)

Restoration Approach
Reduce pollution and hydrologic degradation to coastal watersheds (PDARP/PEIS 5.5.5)
Restoration Technique
Restore hydrologic connections to enhance coastal habitats (PDARP/PEIS Appendix 5.D.1.1)
Project Location
Lower Suwannee River NWR, Chiefland, Florida (Figure 2-23)
Project Summary
The project would be implemented by the DOI FL TIG Trustee in coordination with the USFWS and Lower Suwannee NWR. Potential partners may include USGS, Suwannee River Water Management District (SRWMD), FWC, FDEP, Florida Department of Agriculture and Consumer Services (FDACS), Florida Forest Service, Big Bend Seagrass Aquatic Preserve, UF, The Conservation Fund, NWR Association, Dixie County, Levy County, and the towns of Suwannee and Horseshoe Beach. This is a P&D project to analyze existing information and conduct modeling to determine the most effective locations for restoration actions to improve hydrologic conditions in the Lower Suwannee NWR. This project would build on work completed through a GEBF project: Recovery and Resilience of Oyster Reefs in the Big Bend of Florida. Specifically, the project would include: • Compilation and analysis of existing water quality and flow data to establish baseline site conditions; • Hydrologic assessment and modeling of overland surface water flows on the Lower Suwannee NWR to identify locations where culverts, low water crossing, and road removal can be used to restore flows; • Design of a restoration strategy to improve hydrologic conditions. The Lower Suwannee NWR has approximately 143 miles of roads and trails, consisting mostly of primary and secondary roads used for access and management. All the maintained roads are former logging roads constructed to access timber stands and built using onsite material excavated from either side of the road bed creating roadside ditches which remain. Approximately 25 miles of these roads and trails are not maintained, needed, or are no longer utilized by the NWR. Within this network of roads and trails, the NWR maintains more than 100 culverts, five concrete bridges, and 46 low water crossings. The project would analyze existing information and hydrologic modeling to identify road sections, that when removed, would help restore hydrologic connections on the NWR. After identifying the appropriate locations, a future phase of this project would include constructing/installing culverts, low water crossings, or removing sections of road at locations recommended based on the hydrologic assessment. As a result, water that has historically been impounded by the system of roads and ditches in the upper watershed would be released and flow overland and into the estuary. The project would provide the necessary information to allow DOI to plan a successful future project to implement restoration actions at the recommended locations on the Lower Suwannee NWR, as well as provide partners responsible for managing adjoining conservation lands with recommended management actions to further improve hydrologic conditions in the watershed. The future restoration actions would improve hydrologic connectivity in the Lower Suwannee NWR, resulting in more natural salinity regimes in the lower Suwannee River and Suwannee Sound. Future restoration would also directly improve water quality in watersheds injured by the DWH oil spill by restoring hydrologic connections between the NWR and Suwannee River Estuary and would enhance coastal habitats impacted by the spill. Replacement of road sections with culverts and low water crossing would help restore hydrologic connectivity, restore freshwater flows to the estuary, and subsequently benefit fish and wildlife, such as Gulf sturgeon and oysters, and commercial and

recreational fisheries. Increased freshwater flows would also reduce the effects of saltwater intrusion in the lower portion of the NWR. Long-term benefits to the resources and their services injured by the spill would include improved health and resilience of coastal and marine habitats and resources.

Project Activities and Implementation Details

Project activities would include compilation and analysis of existing water quality/quantity and flow data to establish baseline site conditions, hydrologic investigation and modeling of overland flow patterns on the NWR to identify road sections that could be altered to resolve connectivity issues, and design of a restoration strategy (i.e., locations and design of culverts, and low-water crossings). Data compiled and/or generated from this project would be stored at FDACS, SRWMD and UF.

The project would be completed in approximately two years.

Maintenance

None anticipated (planning initiative).

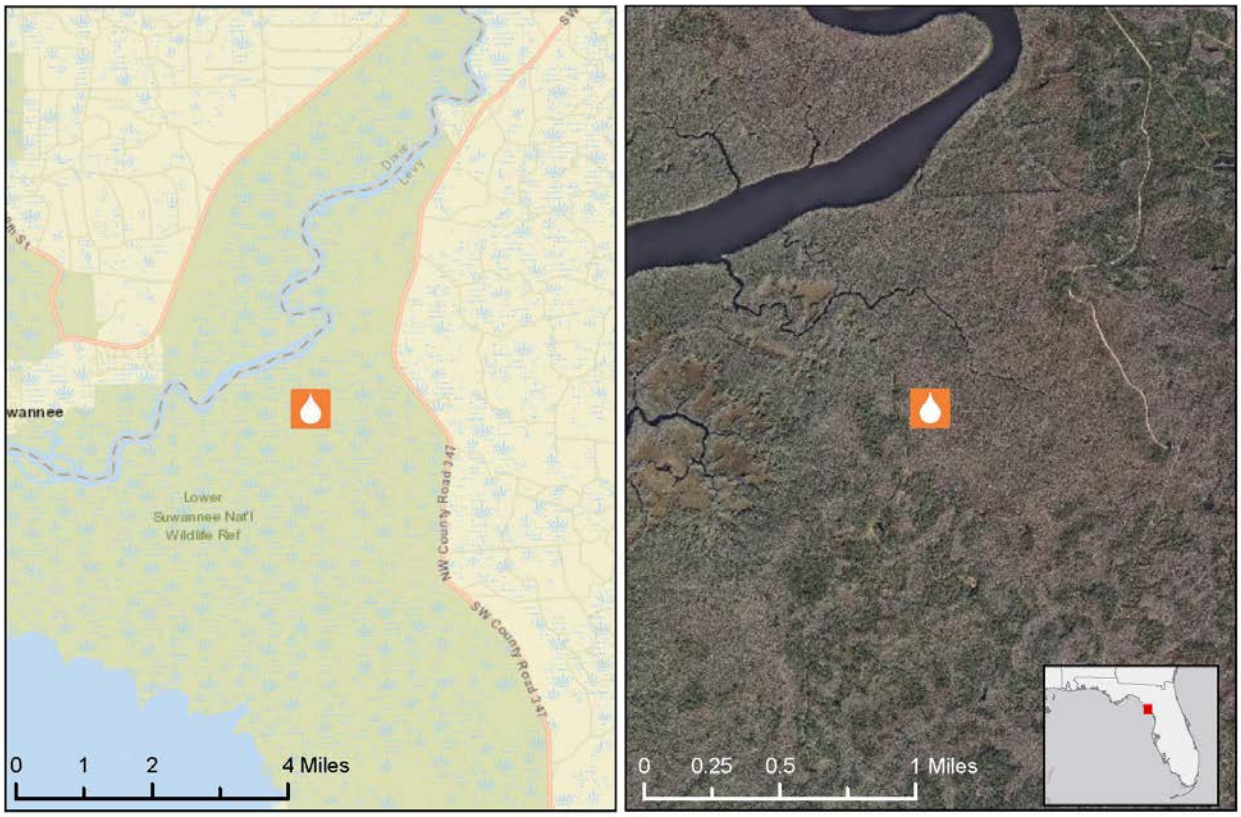
Project Monitoring

Consistent with Section 10 of the Trustee SOPs, a MAM plan is not required for projects with only P&D activities, and therefore a MAM plan for this project has not been developed.

Costs

The estimated costs are $500,000 for P&D, oversight, and administration.

Figure 2-23 WQ11, Lower Suwannee National Wildlife Refuge Hydrologic Restoration (P&D): General Project Location

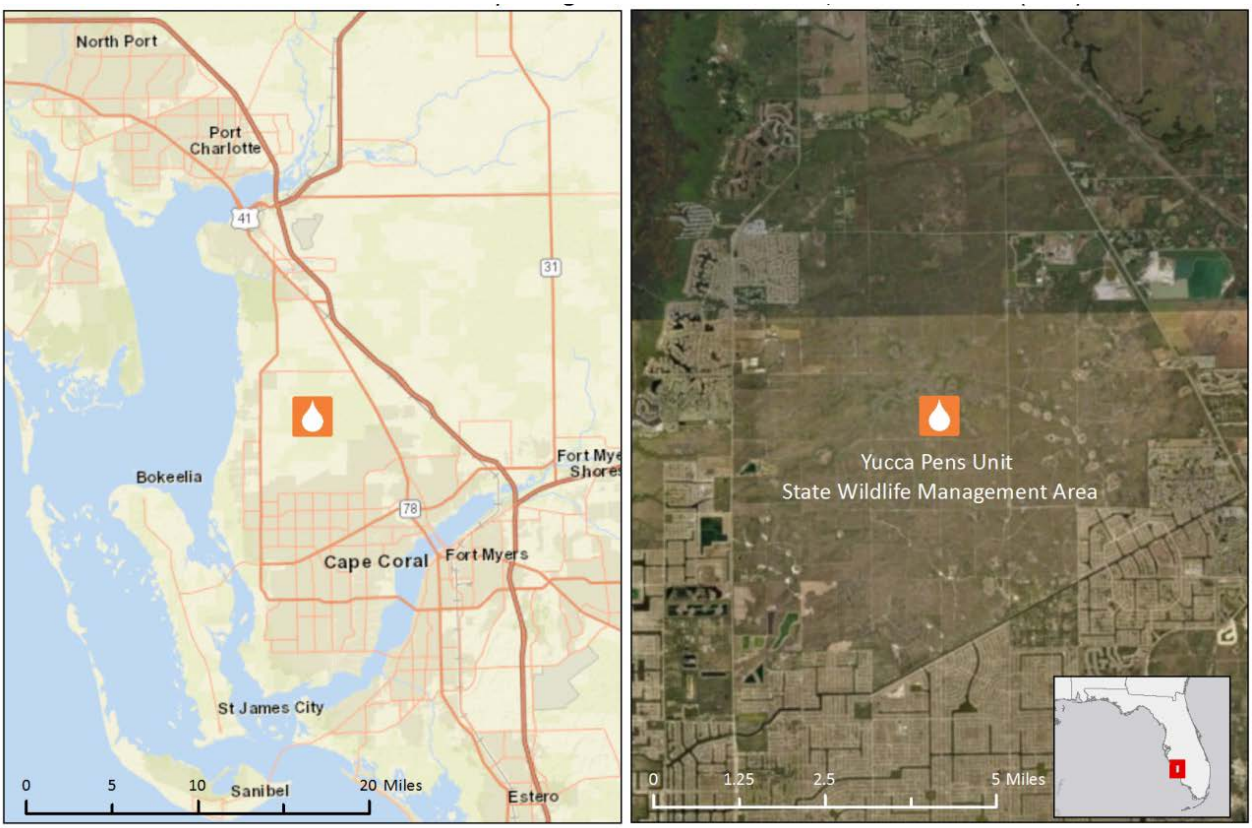


WQ12, Lower Charlotte Harbor Flatwoods Hydrologic Restoration Initiative, Yucca Pens Unit (P&D) (preferred)

Restoration Approach
Reduce pollution and hydrologic degradation to coastal watersheds (PDARP/PEIS 5.5.5)
Restoration Technique
Restore hydrologic connections to enhance coastal habitats (PDARP/PEIS Appendix 5.D.1.1)
Project Location
Charlotte and Lee Counties, Florida (Figure 2-24)
Project Summary
The project would be implemented by the FDEP FL TIG Trustee in coordination with the South Florida Water Management District (SFWMD), the Charlotte Harbor National Estuary Program, FWC, City of Cape Coral, Lee County, and Charlotte County. The project would reduce pollution and hydrologic degradation to coastal watersheds in lower Charlotte Harbor through development and implementation of a science-based, data-driven Strategic Hydrological Planning Tool that would provide resource management agencies guidance for restoration and management of surface waters that flow through the 15,014-acre Yucca Pens Unit of the Cecil Webb/Babcock Wildlife Management Area (WMA) into eastern Charlotte Harbor and the Caloosahatchee River via tidal channels. Specific activities include: • Baseline data collection for the modeling effort including installing approximately 70 piezometers and sensors, GPS survey of the piezometers, installing 16 flow-meters in tidal creeks and canals, installing eight rain gauges, mapping historical hydropatterns, and mapping existing conditions; • Development of the Strategic Hydrological Planning Tool; • Completion of multiple model runs including a historic/pre-development conditions model/natural systems model, existing conditions model, and future conditions model; • Development of final report, summarizing results of each model run and recommendations on priority restoration and management projects or actions and associated benefits and implementation costs. Development, including the construction of major roadways such as US 41 and I-75, has significantly altered the historic surface water sheet flow from the Yucca Pens Unit into Charlotte Harbor and Caloosahatchee River by draining the area and directing freshwater discharges into Charlotte Harbor. This has also resulted in excess discharges of water and nutrients into the Caloosahatchee tributaries. The Strategic Hydrological Planning Tool would be used to establish an accurate understanding of the pre-development hydrologic conditions (historic), existing conditions, and future conditions in the 80,772-acre WMA. Priority restoration and management projects and actions that would re-hydrate the Yucca Pens Unit and reduce peak discharges to the harbor would be developed based on anticipated benefits and implementation cost estimates. This comprehensive approach of data collection, evaluation, and planning will ensure the success of any selected restoration projects, stakeholder participation, and appropriate ecosystem management in an area where water resources are becoming difficult to manage. The project would help collect information needed to reduce pollution and hydrologic degradation to coastal wetlands by restoring hydrologic connections to enhance coastal habitats in watersheds injured by the DWH oil spill. Restoring surface water sheet flow and moderating excessive freshwater discharges would have subsequent benefits to habitats, fish, and wildlife. Long-term benefits to the resources and their services injured by the spill would include improved health and resilience of coastal and marine habitats and resources.
Project Activities and Implementation Details

Project activities would include installation of survey equipment, mapping of project area, 17 months of data collection (two wet seasons and antecedent dry seasons), model calibration, and implementation, and generation of a planning tool. The project would be completed approximately 26 months from the start date.
Maintenance
Maintenance and calibration of in-situ sensors, gauges, and flow meters throughout the implementation/data collection period.
Project Monitoring
Consistent with Section 10 of the Trustee SOPs, a MAM plan is not required for projects with only P&D activities, and therefore a MAM plan for this project has not been developed.
Costs
The estimated costs are $635,500 and include P&D, monitoring, and administrative oversight.

Figure 2-24 WQ12, Lower Charlotte Harbor Flatwood Hydrologic Restoration Initiative, Yucca Pens Unit (P&D): General Project Location



2.5.4 Project Descriptions: Provide and Enhance Recreational Opportunities

This RP/EA identifies 11 restoration alternatives consistent with the Provide and Enhance Recreational Opportunities Restoration Goal (PDARP/PEIS Section 5.3.1) and the underlying Provide and Enhance Recreational Opportunities Restoration Type (PDARP/PEIS Section 5.5.14). The PDARP/PEIS indicates that recreational uses have recovered. The purpose of these alternatives is to provide compensatory restoration for losses that occurred between April 2010 and November 2011, after which recreational use returned to baseline levels.

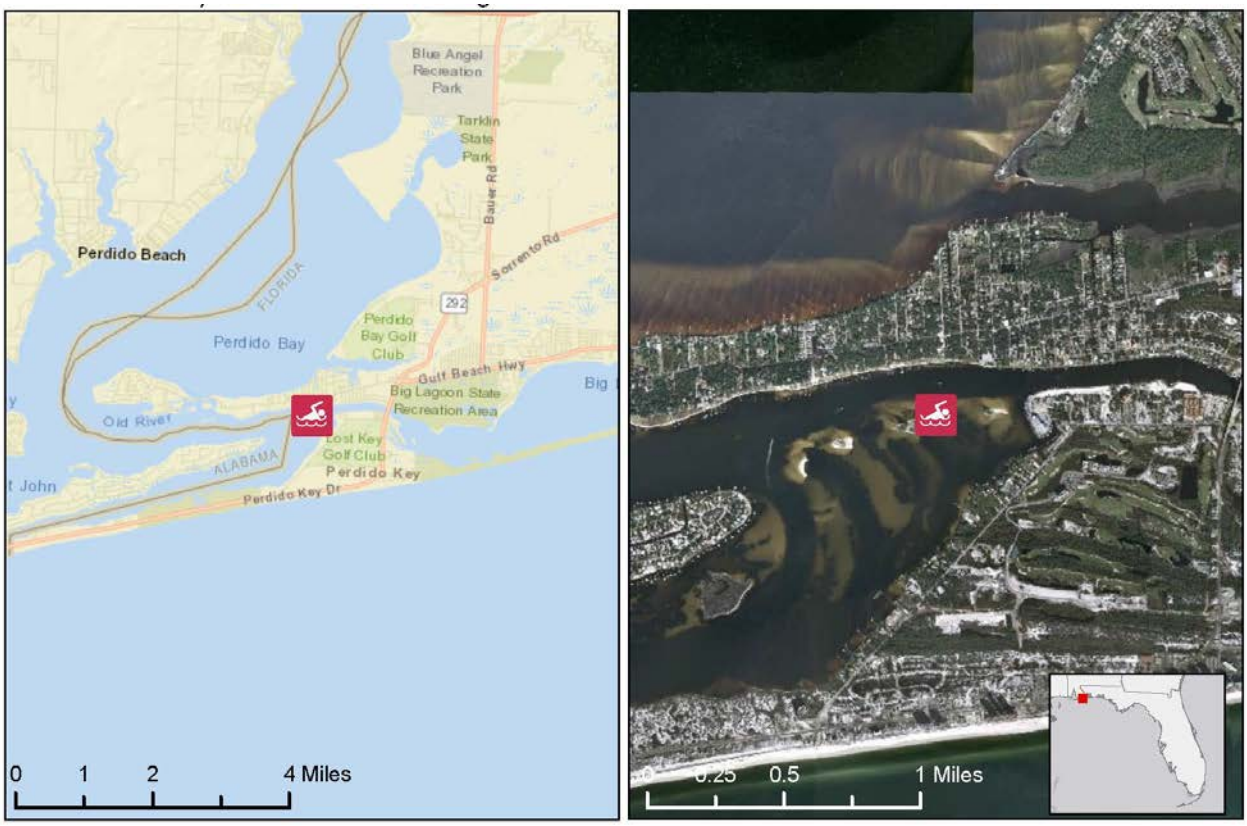
1. Perdido Bay Sunset Islands Snorkeling Trail;
2. Tarkiln Bayou Preserve State Park Improvements;
3. Perdido River and Bay Paddle Trail (preferred);
4. Carpenter Creek Headwaters Park Amenities (preferred);
5. Gulf Islands National Seashore (Florida) Rehabilitation of Okaloosa Unit Recreational Facilities (preferred);
6. Joe's Bayou Recreation Area Improvements (preferred);
7. Topsail Hill Preserve State Park Improvements (preferred);
8. St. Andrews State Park Improvements (preferred);
9. Camp Helen State Park Improvements (preferred);
10. T.H. Stone Memorial St. Joseph Peninsula State Park Improvements (preferred);
11. St. Marks National Wildlife Refuge Coastal Trail Connection, Spring Creek to Port Leon (preferred).

A description of each of these restoration alternatives is provided below.

REC1, Perdido Bay Sunset Islands Snorkeling Trail

Restoration Approach
Enhance public access to natural resources for recreational use (PDARP/PEIS 5.5.14)
Restoration Technique
Construction or enhancement of recreational infrastructure (PDARP/PEIS Appendix 5.D.8.1)
Project Location
Perdido Bay, Escambia County, Florida (Figure 2-25)
Project Summary
The project would be implemented by the FDEP FL TIG Trustee in coordination with the Escambia County, Natural Resources Management Department. The project would provide and enhance recreational opportunities by constructing additional recreational opportunities in Perdido Bay. This project would build on work completed through the DWH Early Restoration Phase I project: Florida Boat Ramp Enhancement and Construction Project, specifically the Galvez Landing Boat Ramp, and the DWH Early Restoration Phase V, Florida Coastal Access Project, specifically Innerarity Point Park. Specifically, this project would include: • Construction of a breakwater; • Establishment of a snorkeling trail with underwater educational signage. The project would enhance kayaking, paddle boarding, and other passive recreational use from the nearby county-owned Galvez Boat Ramp.
Project Activities and Implementation Details
Project activities include planning, design, permitting, and construction of amenities, and monitoring and maintenance activities. The project would be completed in approximately three years. Year 1 would include planning, design, and permitting of the amenities. Years 2 and 3 would include construction activities.
Maintenance
Inspection and maintenance of amenities in the short- and long-term.
Project Monitoring
This project has not been identified as a preferred alternative by the FL TIG at this time, and therefore a project MAM plan has not been developed.
Costs
The estimated costs are $840,000 and include planning, design, construction, monitoring, oversight, and contingency costs.

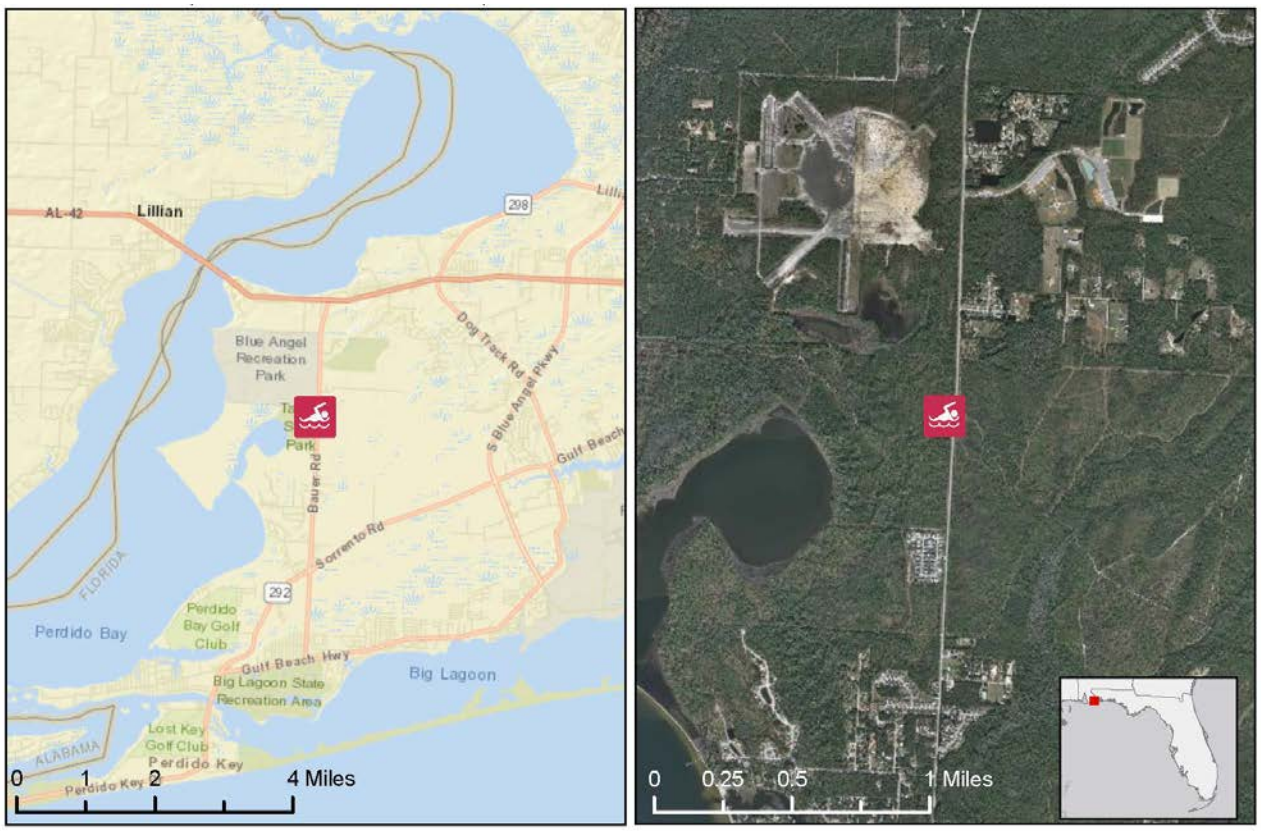
Figure 2-25 REC1, Perdido Bay Sunset Islands Snorkeling Trail: General Project Location



REC2, Tarkiln Bayou Preserve State Park Improvements

Restoration Approach
Enhance public access to natural resources for recreational use (PDARP/PEIS 5.5.14)
Restoration Technique
Construction or enhancement of recreational infrastructure (PDARP/PEIS Appendix 5.D.8.1)
Project Location
Tarkiln Bayou Preserve State Park, Escambia County, Florida (Figure 2-26)
Project Summary
The project would be implemented by the FDEP FL TIG Trustee, in coordination with FDEP Division of Recreation and Parks. The project would provide and enhance recreational opportunities by constructing new recreational access and amenities at Tarkiln Bayou Preserve State Park. Specifically, this project would include: • Expansion of the parking area at the entrance to the park; • Construction of a paddle-craft launch at the end of the existing boardwalk into Tarkiln Bayou; • Enhancements to Dupont Road (approximately two miles) from the parking entrance area to the beach-use area (e.g., subgrade firelines, low water crossings, 3,900-foot geotextile fabric repair); • Construction of a small parking area, two small picnic pavilions, ten tent-only campsites, and one composting restroom at the beach-use area. Tarkiln Bayou Preserve State Park conserves a significant example of the natural communities that were originally found in the coastal region of the Florida Panhandle. The property contains unique natural resources that provide outstanding opportunities for resource-based outdoor recreation. The project would enhance public access by providing access to a recreational area, and by providing improved water access amenities on Tarkiln Bayou and Perdido Bay.
Project Activities and Implementation Details
Project activities include planning, design, permitting, and construction of amenities, and associated monitoring and maintenance activities. The project would be completed in approximately three years. Year 1 would include planning, design, and permitting of the amenities. Years 2 and 3 would include construction activities.
Maintenance
Inspection and maintenance of amenities in the short- and long-term.
Project Monitoring
This project has not been identified as a preferred alternative by the FL TIG at this time, and therefore a project MAM plan has not been developed.
Costs
The estimated costs are $2,719,670 and include planning, design, construction, monitoring, oversight, and contingency costs.

Figure 2-26 REC2, Tarkiln Bayou Preserve State Park Improvements: General Project Location

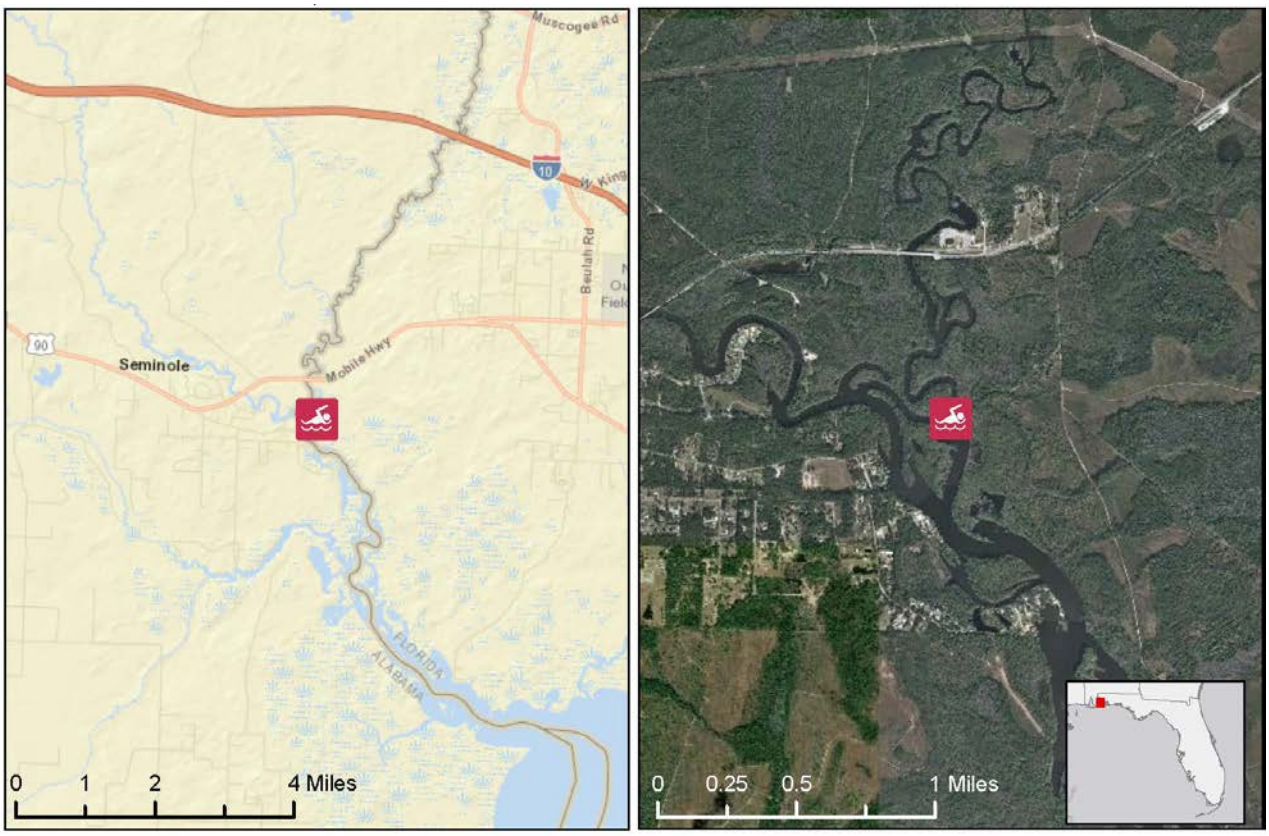


REC3, Perdido River and Bay Paddle Trail (preferred)

Restoration Approach
Enhance public access to natural resources for recreational use (PDARP/PEIS 5.5.14)
Restoration Technique
Construction or enhancement of recreational infrastructure (PDARP/PEIS Appendix 5.D.8.1)
Project Location
Multiple sites along the Perdido River, Escambia County, Florida (Figure 2-27)
Project Summary
The project would be implemented by the FDEP FL TIG Trustee in coordination with TNC, NWFWMD, and Escambia County. The project includes actions to provide and enhance recreational opportunities along Perdido River by constructing recreational access and amenities at multiple locations along the Florida side of the river. This project would build on work completed through the DWH Early Restoration Phase I: Florida Boat Ramp Enhancement and Construction Project, specifically Perdido River Public Boat Ramp. Specifically, the project would include: • Construction (by the NWFWMD) of seven elevated shelters at five sites along the Perdido River; o Burnt Car Landing– shelter with composting toilet o Muscogee Site – shelter with composting toilet o Horse Trail Site – shelter with composting toilet o Sand Landing – two shelters with composting toilets and an improved canoe launch o Otto Hill Site – two shelters with composting toilets • Construction (by TNC) of two shelters and kiosks on the Perdido River Nature Preserve; • Construction (by Escambia County) of an entrance drive, a parking area, and a shelter at Heron Bayou. At Heron Bayou, a boat ramp would be constructed that requires associated dredging, but these activities would not be funded using NRDA funds. This project leverages an FWC Boating and Waterways match grant for design, engineering, and permitting of a public boat launch and recreational facility. The project would complement other recreational components of TNC's Perdido River Water Quality Protection, Habitat Restoration and Recreational Enhancement project and Escambia County's Perdido River and Bay Paddle Trail and Boating Improvements project. The project would also complement the paddling trail Alabama has developed on the west side of the Perdido River and Bay, by adding additional sites on the east side of the river and south to Perdido Bay. Alabama has completed construction of three landing areas, five paddle-craft launches, and four shelters on the west side of the river and bay. The project would enhance public access by providing access (including water access) to recreational areas with no existing recreational access (i.e., Heron Bayou) and by providing new amenities (i.e., shelters).
Project Activities and Implementation Details
Project activities include planning, design, permitting, and construction of amenities, and associated monitoring activities. The project would be completed in approximately three years. Year 1 would include planning, design, and permitting of the amenities. Years 2 and 3 would include construction activities.
Maintenance
Inspection and maintenance of amenities in the short- and long-term.
Project Monitoring
Project monitoring details are provided in the project MAM plan found in Appendix B.

Costs
The estimated costs are $1,165,488 and include planning, design, construction, monitoring, oversight, and contingency costs.

Figure 2-27 REC3, Perdido River and Bay Paddle Trail: General Project Location



REC4, Carpenter Creek Headwaters Park Amenities (preferred)

Restoration Approach

Enhance public access to natural resources for recreational use (PDARP/PEIS 5.5.14)

Restoration Technique

Construction or enhancement of recreational infrastructure (PDARP/PEIS Appendix 5.D.8.1)

Project Location

Escambia County, Florida (Figure 2-28)

Project Summary

The project would be implemented by the FDEP FL TIG Trustee in coordination with the Escambia County Natural Resources Management Division. Other project partners include the City of Pensacola, Pensacola and Perdido Bays Estuary Program, Emerald Coastkeeper, UWF, Bayou Texar Foundation, UF IFAS Extension, Washington High School Marine Science Academy, Bream Fishermen Association, and the Audubon Society (Florida Chapter). The project includes actions to provide and enhance recreational opportunities through the construction of a public park at the headwaters of Carpenter Creek. The project is a companion to a water quality improvement project in this RP/EA (WQ5, Carpenter Creek Stormwater Improvements Project), both of which are part of the Carpenter Creek and Bayou Texar Watershed Management Plan (funded through Escambia County's RESTORE Direct Component project). When complete, the Watershed Management Plan would recommend and describe future priority restoration and public access needs in the watershed.

Specifically, the project would include:

- Construction of a 2,000-foot-long trail (including an elevated boardwalk portion) that provides an access point to the lake feature on the property;
- Construction of a paddle-craft launch (as a walkway to the shoreline, not an in-water structure), passive recreation area (e.g., benches and tables), and a 12-space parking area (approximately 12,000 square feet);
- Installation of educational signage describing the benefits of this project and the companion water quality project.

The project area is within the jurisdiction of Escambia County, within the highly urbanized Carpenter Creek and Bayou Texar watershed. In 2017, Escambia County purchased the approximately seven-acre headwater parcel to prevent further encroachment within Carpenter Creek, improve water quality, and develop the first public access to the creek.

The project would enhance public access by providing a new recreational opportunity in an area with no current recreational access. The trail and paddle-craft launch would allow users to access the lake feature, a result of a series of beaver dams. The new parking area would also enhance public access to the area. The passive recreation area would feature tables and benches to allow users to enjoy the park views while maintaining the native tree canopy. The educational signage would enhance awareness of the restoration efforts and importance of the creek and watershed.

Project Activities and Implementation Details

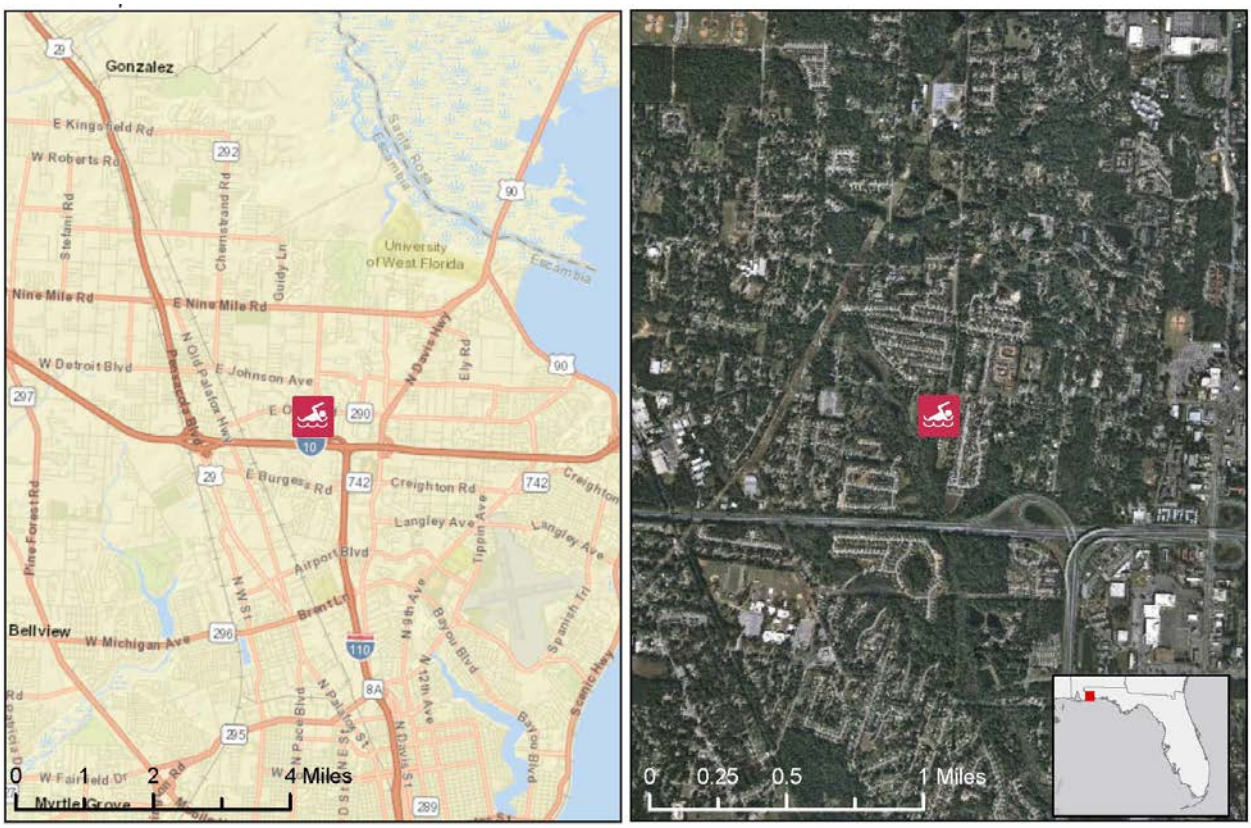
Project activities include planning, design, permitting, construction of amenities, and associated monitoring activities.

The project would be completed in approximately three years. Year 1 would include planning, design, and permitting of the amenities. Years 2 and 3 would include construction activities.

Maintenance

Inspection and maintenance of amenities in the short- and long-term (to be conducted by the County with local funds).
Project Monitoring
Project monitoring details are provided in the project MAM plan found in Appendix B.
Costs
The estimated costs are $446,080 and include planning, design, construction, monitoring, oversight, and contingency costs.

Figure 2-28 REC4, Carpenter Creek Headwaters Park Amenities: General Project Location

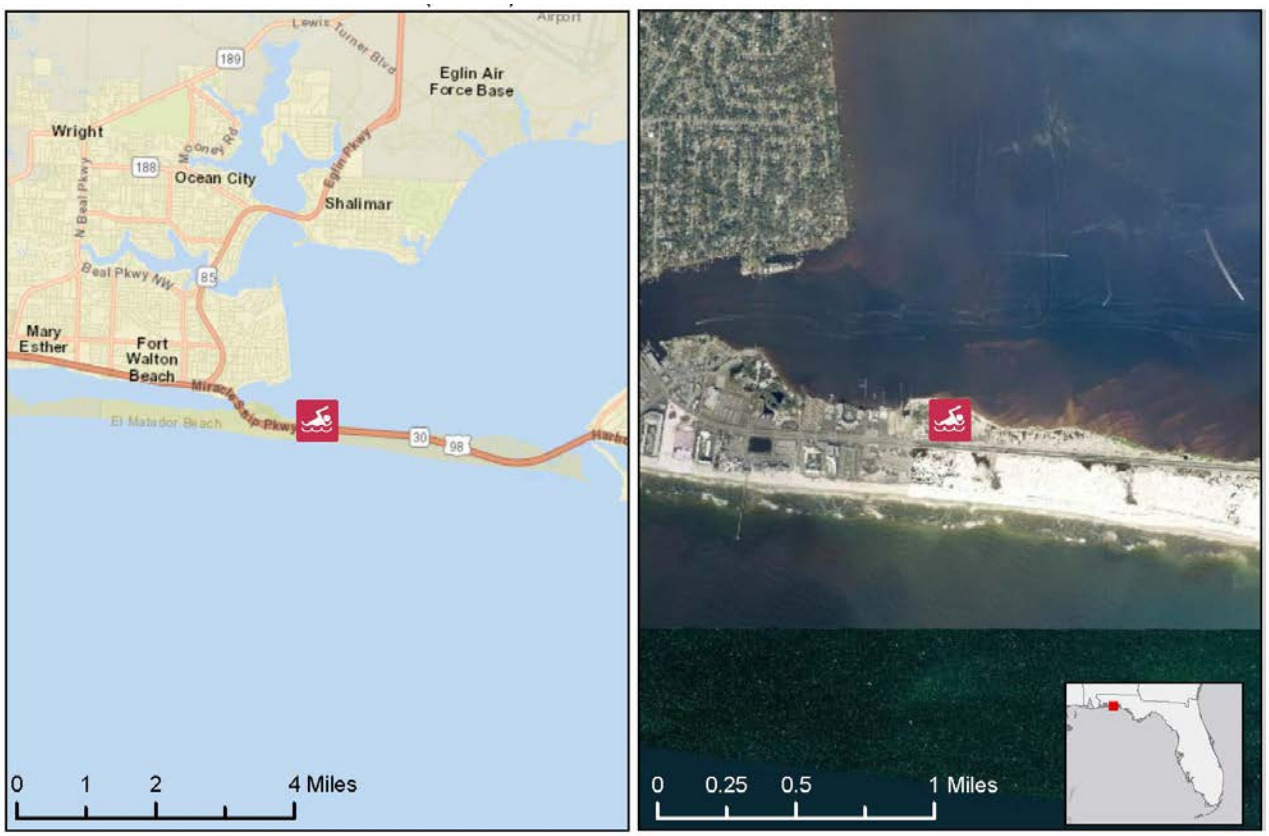


REC5, Gulf Islands National Seashore (Florida) Rehabilitation of Okaloosa Unit Recreational Facilities (preferred)

Restoration Approach
Enhance public access to natural resources for recreational use (PDARP/PEIS 5.5.14)
Restoration Technique
Construction or enhancement of recreational infrastructure (PDARP/PEIS Appendix 5.D.8.1)
Project Location
GUIS, Florida District, Okaloosa County (Figure 2-29)
Project Summary
The project would be implemented by the DOI FL TIG Trustee in coordination with NPS and GUIS staff. The project would include rehabilitation of recreational facilities at the Okaloosa Unit of GUIS including re-vegetation efforts and rehabilitating a boat ramp, floating pier, restroom, lift station, electrical systems, parking area, RV sites, picnic areas, gates, boardwalks, and fencing. Specifically, the project would include: • Removal of an existing boat ramp and construction of a new boat ramp; • Removal of an existing restroom and construction of a new restroom facility; • Construction of a floating pier, lift station, parking lot (including overflow parking), boardwalk from the parking area to the beach, and fencing of some existing foot paths through beach and dune habitat where pavement is removed; • Removal of existing parking spaces and pavement, pave additional area for boat launch parking and access, resurface remaining parking lot and entrance/exit road, and add gravel overflow parking area; • Replacement of electrical systems; • Removal of existing RV sites and installation of two new RV sites with utility hook-ups; • Removal of existing picnic tables and concrete pads and construction of a picnic area pavilion with approximately ten picnic tables; • Installation of automatic gates at the entrance and exit; • Re-vegetation of some existing foot paths through beach and dune habitat and areas where pavement is removed. Nearly every recreational opportunity at the project area would be enhanced including boating, picnicking, RV amenities, and beachgoing. The project focuses on enhancing the public's recreational experiences such as swimming, boating, diving, bird watching, beach-going, and fishing, which can vary depending on the appearance and functional condition of the surrounding environment in which they occur.
Project Activities and Implementation Details
Project activities include planning, design, construction and rehabilitation of amenities, and associated monitoring activities. The project would be completed in approximately two years months. Year 1 would include contract procurement and planning and design. Year 2 would include construction activities.
Maintenance
No short-term maintenance activities are anticipated. Long-term maintenance activities would be incurred by GUIS or other sources and could include activities such as sealing, resurfacing, and remarking paved areas; painting or staining exposed wood; lubricating new lift station pumps and automatic gate hardware; weed control; and minor repairs of broken or insufficiently fastened (e.g., loose screws or nails) boards, handles, doors, fencing, electrical outlets or lights.

Project Monitoring
Project monitoring details are provided in the project MAM plan found in Appendix B.
Costs
The estimated costs are $3,201,383 and include planning, design, construction, monitoring, oversight, and contingency costs.

Figure 2-29 REC5, Gulf Islands National Seashore (Florida) Rehabilitation of Okaloosa Unit Recreational Facilities: General Project Location

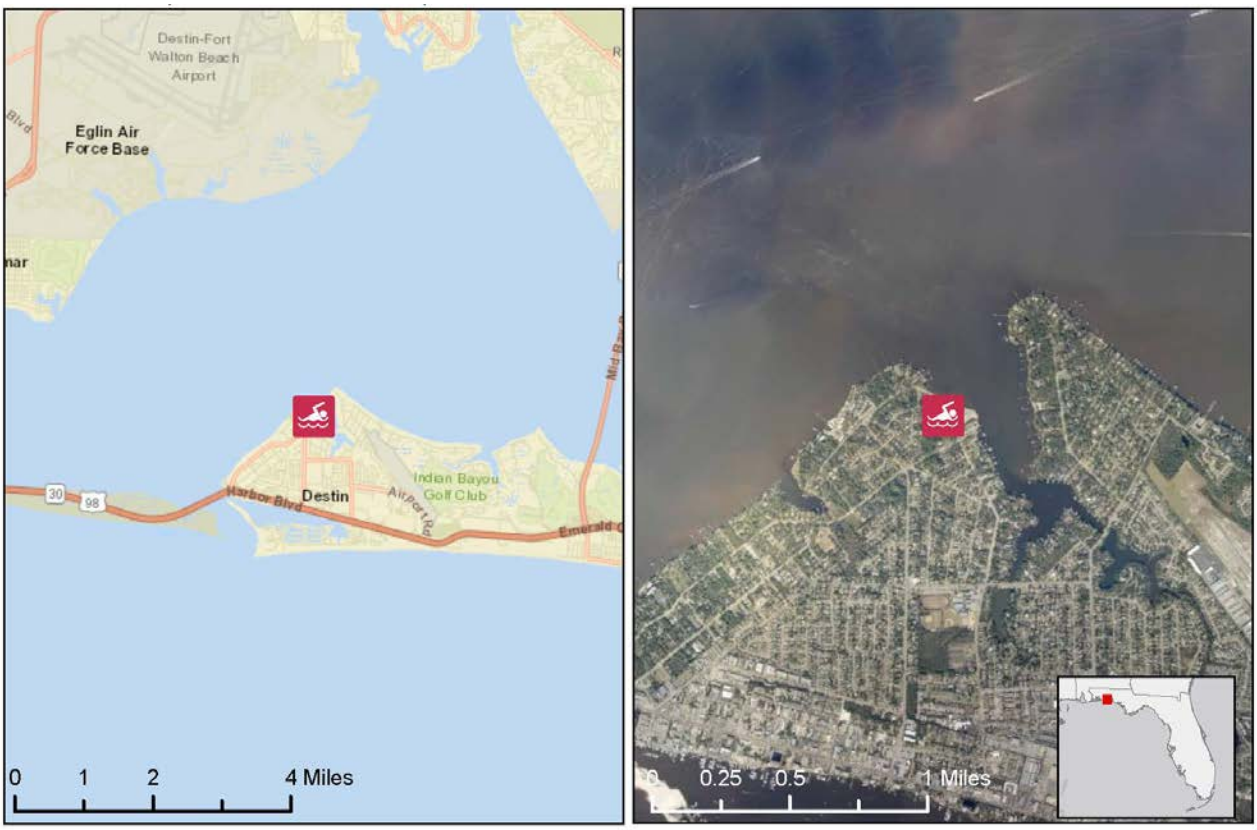


REC6, Joe's Bayou Recreation Area Improvements (preferred)

Restoration Approach
Enhance public access to natural resources for recreational use (PDARP/PEIS 5.5.14)
Restoration Technique
Construction or enhancement of recreational infrastructure (PDARP/PEIS Appendix 5.D.8.1)
Project Location
Joe's Bayou Recreation Area, Destin, Okaloosa County, Florida (Figure 2-30)
Project Summary
The project would be implemented by the FDEP FL TIG Trustee, in coordination with the City of Destin and the Choctawhatchee Basin Alliance. The project includes actions to improve access to the existing boat ramp, enhance recreational amenities, and enhance and restore the topography and natural resources at Joe's Bayou Recreation Area and Mattie Kelly Park and Nature Walk. Specifically, for Joe's Bayou, the project would include: • Construction of a reef breakwater, restrooms, walking trails, sidewalks, fishing pier, and boat ramp with pier; • Backfill of the former Cemex plant site; • Replacement of the former Cemex plant retaining wall; • Pond restoration including littoral planting and aeration; • Saltmarsh and upland restoration; • Enhancement and improvements to a kayak/paddle-craft launch and pier; • Rehabilitation and expansion of parking lots; • Interpretive educational signs; • Lighting improvements; and • Landscaping/irrigation/benches/trash receptacles. Additionally, at Mattie Kelly Park, the project would include: • Wetland enhancement; • Construction of additional parking spaces and a boardwalk; and • Drainage and stormwater treatment. The project integrates the development of a master plan, recreational elements, infrastructure improvements, and a comprehensive stormwater management and erosion control plan. The project would enhance public access by providing improved access and parking in a heavily-used recreational area by creating additional boardwalks and trails and providing new water access amenities for paddle and power craft.
Project Activities and Implementation Details
Project activities include planning, design, construction of amenities, and associated monitoring activities. The project would be completed in approximately three years. Year 1 would include planning, design, and permitting of the amenities. Years 2 and 3 would include construction activities.
Maintenance
Inspection and maintenance of amenities in the short- and long-term.
Project Monitoring
Project monitoring details are provided in the project MAM plan found in Appendix B.
Costs
The estimated costs are $12,202,891 and include planning, design, construction, monitoring, oversight, and

contingency costs.

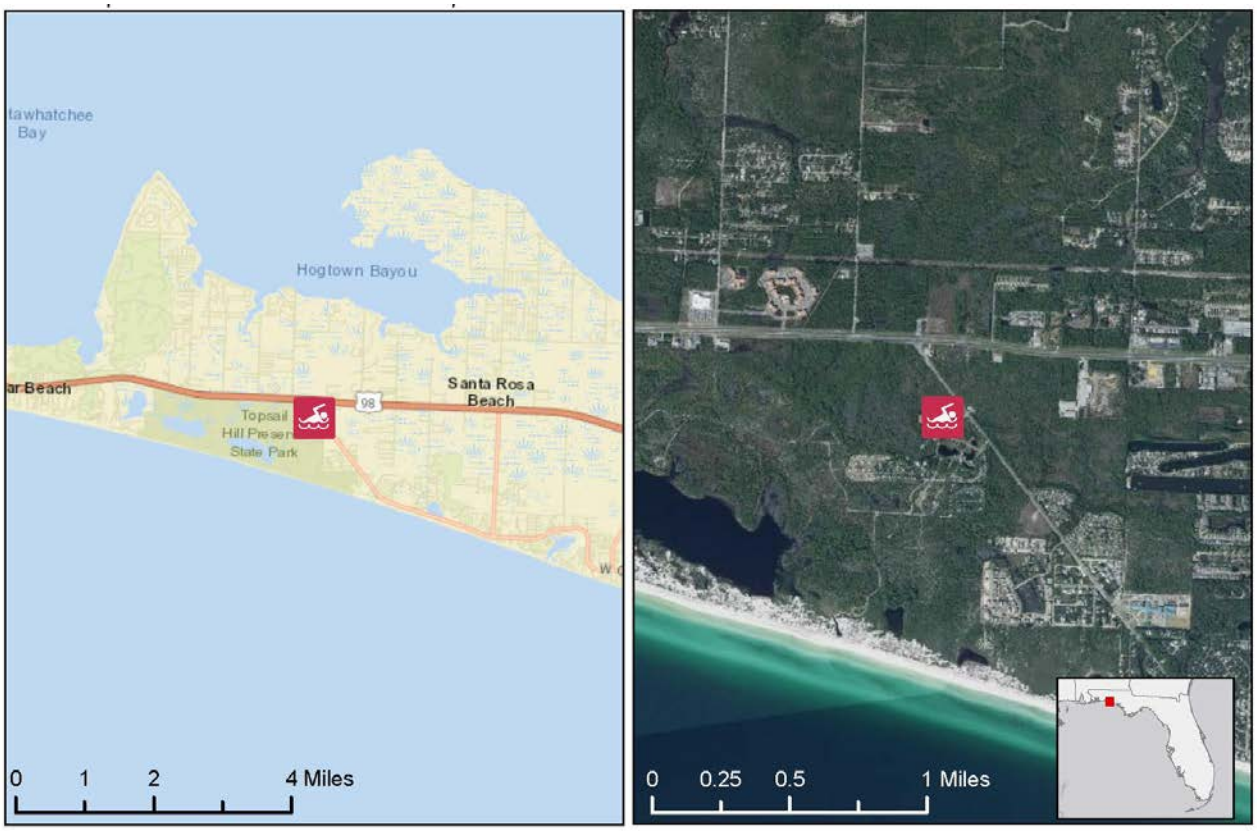
Figure 2-30 REC6, Joe's Bayou Recreation Area Improvements: General Project Location



REC7, Topsail Hill Preserve State Park Improvements (preferred)

Restoration Approach
Enhance public access to natural resources for recreational use (PDARP/PEIS 5.5.14)
Restoration Technique
Construction or enhancement of recreational infrastructure (PDARP/PEIS Appendix 5.D.8.1)
Project Location
Topsail Hill Preserve State Park, Walton County, Florida (Figure 2-31)
Project Summary
The project would be implemented by the FDEP FL TIG Trustee in coordination with the FDEP Division of Recreation and Parks. The project includes actions to provide and enhance recreational opportunities at Topsail Hill Preserve State Park by constructing additional recreational access and amenities. Specifically, the project would include: • Construction of an open-air interpretive pavilion as a waiting area for the tram that currently circulates visitors from the entrance area to the Gulf beach access and Campbell Lake; • Construction of two bike-share stations that would allow visitors to park and ride between the entrance and Gulf beach access areas with the ability to park bicycles at either end; • Construction of an additional boardwalk at the Gulf beach-use area; • Construction of a tram pavilion at the north end of the boardwalk; • Construction of a 10-fixture restroom facility at the north end of the boardwalk; • Construction of a paddle-craft launch on the north shore of Campbell Lake, which would provide recreational access to one of the park's most significant features; • Replacement of the campground bathhouse with a 25-fixture restroom facility; • Connection of all RV campsites and campground facilities to the central sewer system; • Installation of interpretive signage at the entrance and other areas to educate visitors on the restoration efforts and rare coastal dune lake ecosystem. The extensive dune system at Topsail Hill Preserve State Park protects a remnant example of Florida coastal dune lakes, one of the rarest natural community types in the world. The project would provide visitors the opportunity to experience this remarkable site. The project would enhance public access to the recreation area by providing a tram and bike-share stations, improving access to the beach area and Campbell Lake, and improving campground facilities.
Project Activities and Implementation Details
Project activities include planning, design, construction of amenities, and associated monitoring activities. The project would be completed in approximately three years. Year 1 would include planning, design, and permitting of the amenities. Years 2 and 3 would include construction activities.
Maintenance
Inspection and maintenance of amenities in the short- and long-term.
Project Monitoring
Project monitoring details are provided in the project MAM plan found in Appendix B.
Costs
The estimated costs are $3,926,811 and include planning, design, construction, monitoring, oversight, and contingency costs.

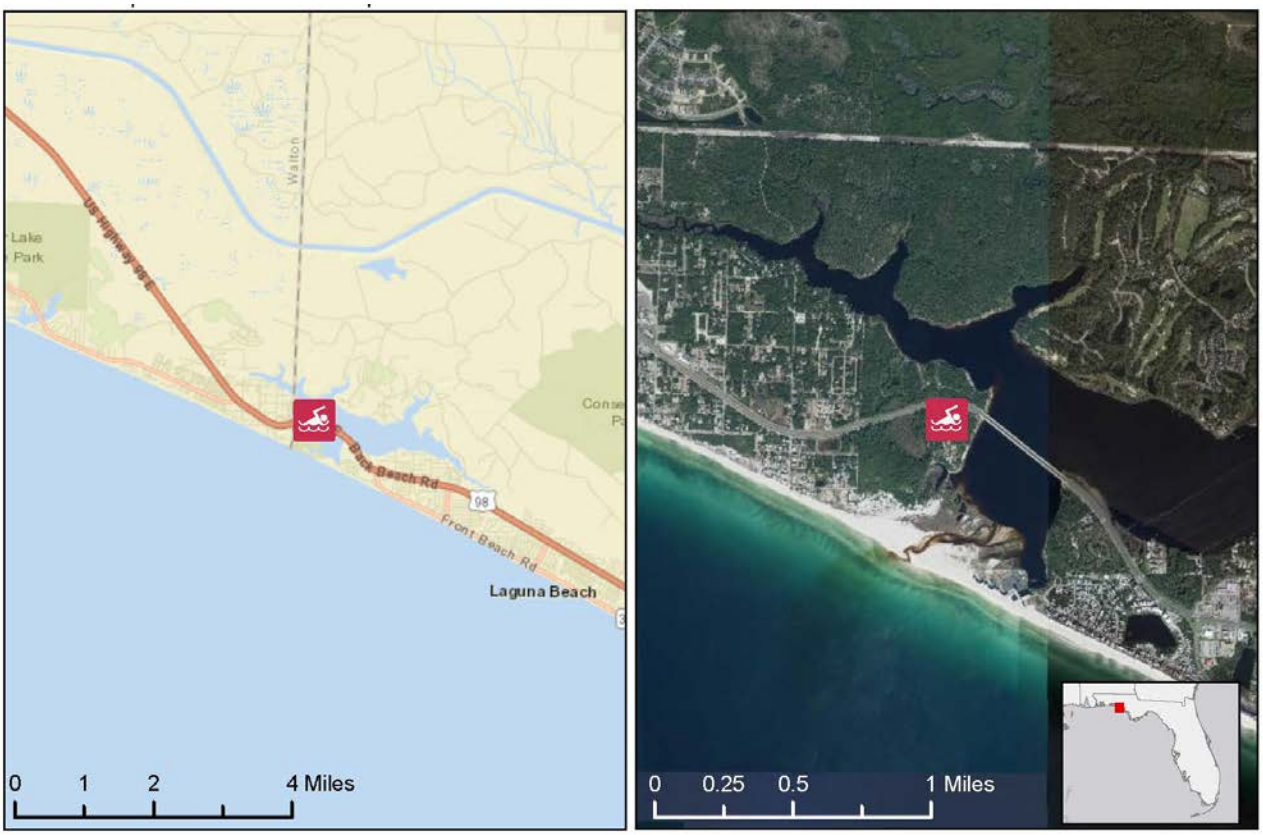
Figure 2-31 REC7, Topsail Hill Preserve State Park Improvements: General Project Location



REC8, Camp Helen State Park Improvements (preferred)

Restoration Approach
Enhance public access to natural resources for recreational use (PDARP/PEIS 5.5.14)
Restoration Technique
Construction or enhancement of recreational infrastructure (PDARP/PEIS Appendix 5.D.8.1)
Project Location
Camp Helen State Park, Bay County, Florida (Figure 2-32)
Project Summary
The project would be implemented by the FDEP FL TIG Trustee in coordination with the FDEP Division of Recreation and Parks. The project includes actions to provide and enhance recreational opportunities at Camp Helen State Park by constructing amenities in a new day-use area on the northern parcel of the park (north of US 98) and two docks and walkway extensions at the Lake Powell waterfront. Specifically, the project would include: • Construction of turn lanes to a 400-foot controlled-access entrance road, a 20-space parking area, a boardwalk, three picnic pavilions, and a 10-fixture restroom; • Construction of two improved docks to access the water (one for paddle-craft and one for power craft) and associated walkway extensions to connect existing walkways to the docks. Camp Helen State Park provides public access to a broad range of significant cultural and natural resources. Its landscape conserves intact scrub, coastal grassland, and beach dune. Restored historic structures and a visitor center tell the local history of the Hicks family and Avondale Mills Retreat. The addition of the day-use area amenities would provide increased and enhanced recreational opportunities to the park.
Project Activities and Implementation Details
Project activities include planning, design, construction of amenities, and associated monitoring activities. The project would be completed in approximately three years. Year 1 would include planning, design, and permitting of the amenities. Years 2 and 3 would include construction activities.
Maintenance
Inspection and maintenance of amenities in the short- and long-term.
Project Monitoring
Project monitoring details are provided in the project MAM plan found in Appendix B.
Costs
The estimated costs are $3,326,027 and include planning, design, construction, monitoring, oversight, and contingency costs.

Figure 2-32 REC8, Camp Helen State Park Improvements: General Project Location



REC9, St. Andrews State Park Improvements (preferred)

Restoration Approach

Enhance public access to natural resources for recreational use (PDARP/PEIS 5.5.14)

Restoration Technique

Construction or enhancement of recreational infrastructure (PDARP/PEIS Appendix 5.D.8.1)

Project Location

St. Andrews State Park, Bay County, Florida (Figure 2-33)

Project Summary

The project would be implemented by the FDEP FL TIG Trustee in coordination with the FDEP Division of Recreation and Parks. The project improves access to use areas in St. Andrews State Park by constructing additional recreational amenities. The project would include redesigning the entrance area to facilitate access and egress of vehicles at the ranger station for day-use visitors and campers and to help alleviate traffic congestion during peak visitation periods; improvements to the Lagoon Use area; improvements to existing parking areas; and the repaving of existing park roadways.

Specifically, the project would include:

- Construction of multiple entry lanes to reduce the extent of vehicle stacking, especially for campers;
- Construction of a new entrance station to serve both day-use entry and camper registration;
- Enhancement of the Lagoon Use area by constructing a paddle-craft launch, 18-fixture restroom area (including parking area travel lane improvements), and two pavilions;
- Construction of a loop trail in buttonbush marsh, including a boardwalk;
- Expansion and improvement of existing parking areas, including sidewalks to connect amenities;
- Repaving of park roadways, including the addition of bike lanes and culverts to help restore natural hydrology.

The pavilions would accommodate picnicking where there are currently unsheltered tables. The paddle-craft launch would be located on a sandy segment of the Grand Lagoon shoreline to utilize the natural surface of the site.

St. Andrews State Park consistently ranks among the five most visited parks in the Florida state park system. The park offers remarkable recreation opportunities unique to its location at the confluence of St. Andrew Bay and the Gulf of Mexico. The project would enhance public access by providing improved access and parking in a heavily-used recreational area, and by providing new water access amenities for paddle-craft. The improvements would also enhance convenience of access to the park's environmental interpretive center and Gulf Pier.

Project Activities and Implementation Details

Project activities include planning, design, construction of amenities, and associated monitoring activities.

The project would be completed in approximately three years. Year 1 would include planning, design, and permitting of the amenities. Years 2 and 3 would include construction activities.

Maintenance

Inspection and maintenance of amenities in the short- and long-term.

Project Monitoring

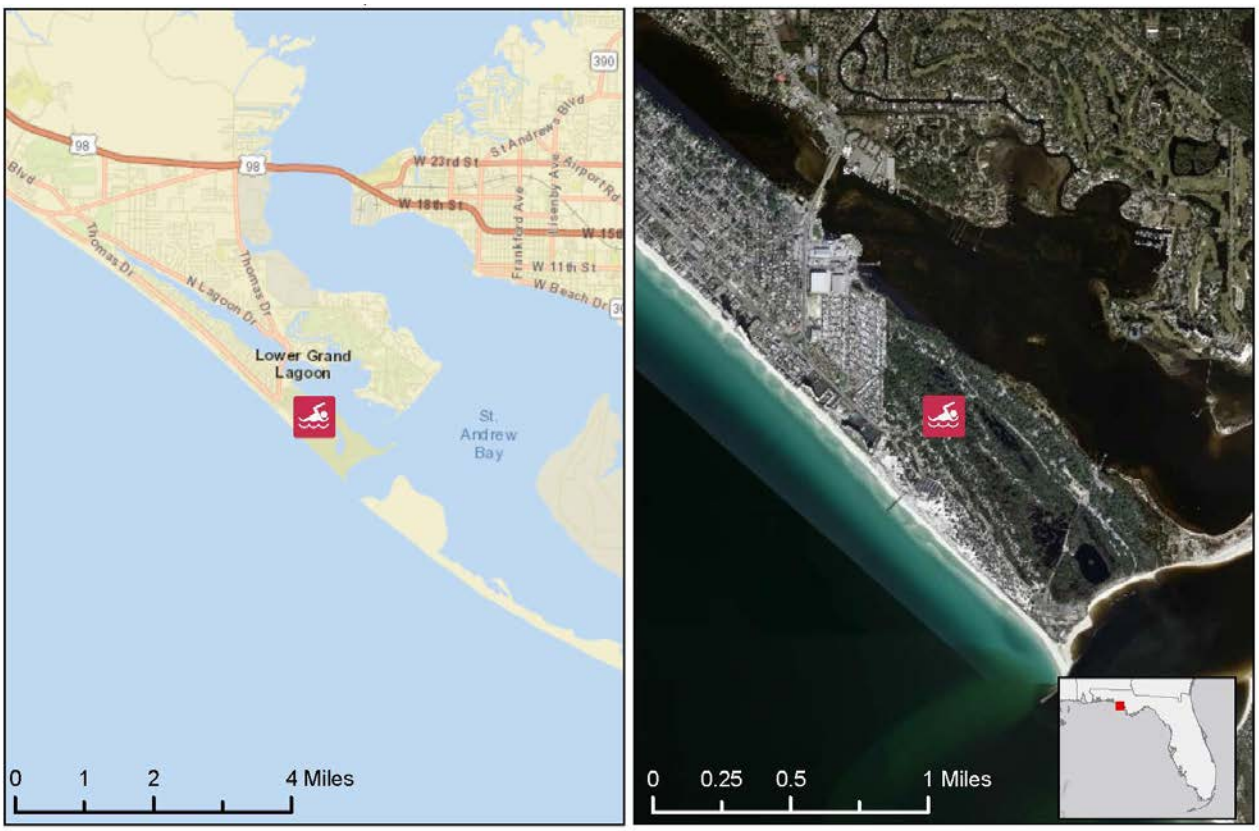
Project monitoring details are provided in the project MAM plan found in Appendix B.

Costs

The estimated costs are $10,875,855 and include planning, design, construction, monitoring, oversight, and

contingency costs.

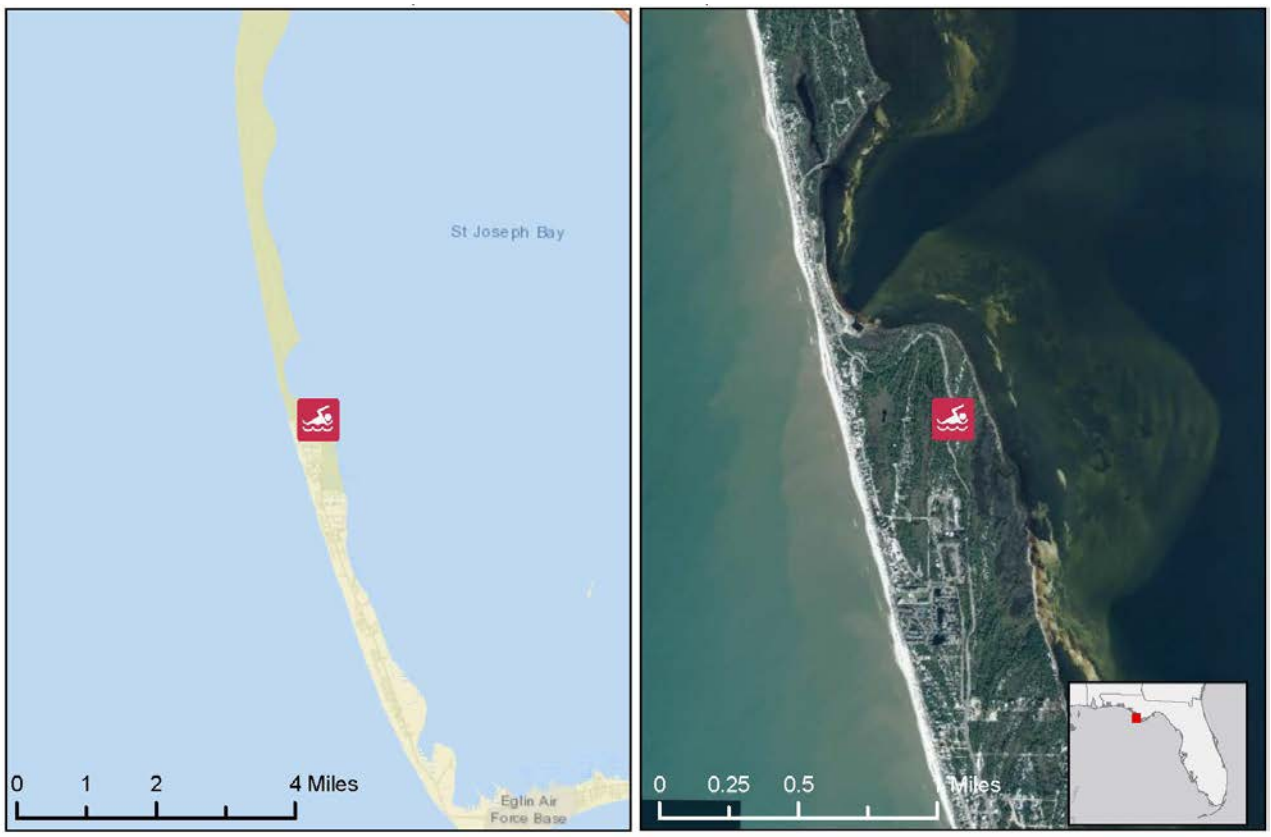
Figure 2-33 REC9, St. Andrews State Park Improvements: General Project Location



REC10, T.H. Stone Memorial St. Joseph Peninsula State Park Improvements (preferred)

Restoration Approach
Enhance public access to natural resources for recreational use (PDARP/PEIS 5.5.14)
Restoration Technique
Construction or enhancement of recreational infrastructure (PDARP/PEIS Appendix 5.D.8.1)
Project Location
T.H. Stone Memorial St. Joseph Peninsula State Park, Gulf County, Florida (Figure 2-34)
Project Summary
The project would be implemented by the FDEP FL TIG Trustee in coordination with the FDEP Division of Recreation and Parks. The project provides and enhances recreational opportunities at the T.H. Stone Memorial St. Joseph Peninsula State Park through the construction of a shared-use path. Specifically, the project would include: • Construction of an approximately 9,800 feet long and 8-foot-wide shared-use path for safe and scenic bicycle and pedestrian access, from the park entrance to the Eagle Harbor Day Use Area and primary Gulf Beach Access. The proposed path would extend an existing shared-use path outside the park, along Gulf CR 30E/Cape San Blas Road, which currently terminates at the park boundary. An estimated 8,600 feet would be asphalt and 1,200 feet would be a boardwalk to mitigate impact to the dune and wetland habitat in the area. The project would increase and enhance tourism and recreational opportunities at the park and in Gulf County by creating bicycle/pedestrian-use infrastructure to increase recreational access and use opportunities.
Project Activities and Implementation Details
Project activities include permitting, construction of amenities, and associated monitoring activities. The project would be completed in approximately three years. Year 1 would include planning, design, and permitting of the amenities. Years 2 and 3 would include construction activities.
Maintenance
Inspection and maintenance of amenities in the short- and long-term.
Project Monitoring
Project monitoring details are provided in the project MAM plan found in Appendix B.
Costs
The estimated costs are $977,945 and include permitting, construction, monitoring, oversight, and contingency costs.

Figure 2-34 **REC10, T.H. Stone Memorial St. Joseph Peninsula State Park Improvements: General Project Location**



REC11, St. Marks National Wildlife Refuge Coastal Trail Connection, Spring Creek to Port Leon (preferred)

Restoration Approach

Enhance public access to natural resources for recreational use (PDARP/PEIS 5.5.14)

Restoration Technique

Construction or enhancement of recreational infrastructure (PDARP/PEIS Appendix 5.D.8.1)

Project Location

St. Marks National Wildlife Refuge, Wakulla County, Florida (Figure 2-35)

Project Summary

The project would be implemented by the USDA FL TIG Trustee in coordination with the St. Marks NWR. Other project partners include USFWS, Florida Trail Association (volunteer support organization), Framing Our Community (non-profit infrastructure support organization), and the NPS Southeast Archaeological Center. The project would provide and enhance recreational opportunities by improving access to and completing the Florida National Scenic Trail (FNST) at St. Marks NWR, a nationally recognized resource.

Specifically, the project would include:

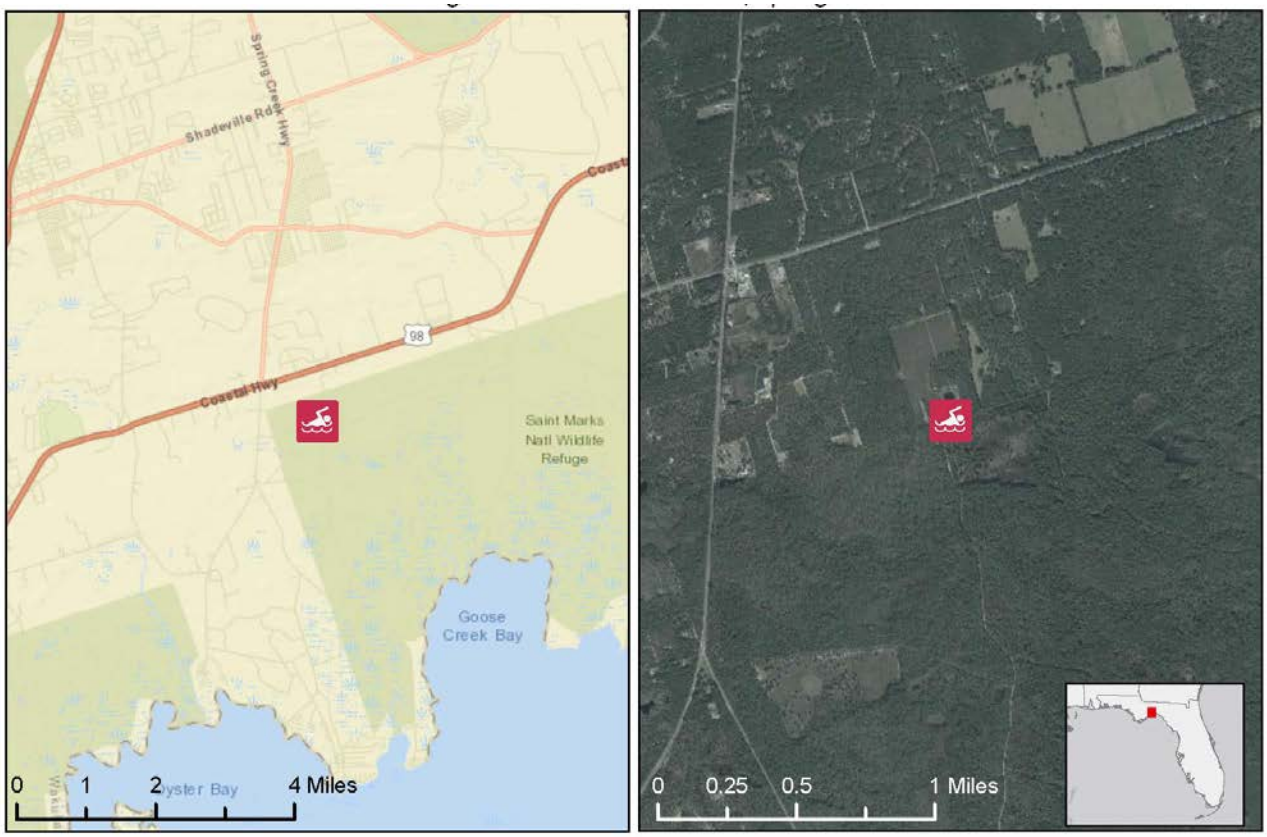
- Construction of a FNST St. Marks NWR segment to complete the Spring Creek trail segment, which includes two boardwalks and puncheon (trail-parallel sills near ground-level). The puncheon would utilize pilings located at 12-foot intervals and would not have railings;
- Construction of infrastructure improvements in Port Leon Wilderness, including 3-4 small-span bridges or boardwalks ranging from 165-300 feet;
- Construction of a suspension bridge spanning approximately ½ acre;
- Construction of one 65-foot wood stringer bridge, to enhance connectivity;
- Development of interpretive materials featuring the natural environment and trail system. Materials would focus on sensitive cultural resources and would be developed in consultation with USDA archeological staff.

The FNST is a low-impact foot path in a natural setting with a light footprint and emphasis on environmental and cultural sensitivity. The FNST runs from Big Cypress National Preserve in southern Florida to GUIS in western Florida and connects some of the state's most outstanding recognized recreation resources in St. Marks NWR. The project would provide not only permanency, protection, and recreational connectivity for the FNST, but it would also allow the public to connect to the historic Port Leon and Civil War-era salt works along the coastal waters of St. Marks NWR. The project would likely foster public support for restoring and conserving habitats and coastal and marine resources through providing opportunities to explore and educate users about Florida's unique natural and cultural resources. Once completed, the St. Marks NWR trail segment would provide over 60 miles of connected, certified trail providing remarkable recreational and educational experience along both the FNST and the Florida Gulf Coast.

The project would help restore and enhance tourism and recreational opportunities along the FNST by providing improved connectivity, infrastructure, access, and education. The upgraded structures, interpretive materials, and enhanced access would improve the FNST system by promoting environmental stewardship, education, and outreach. Interpretive materials along new routes and construction of side trails would highlight areas of cultural significance which would enhance the experience of trail users. The project is designed to ensure minimal impact and adverse impacts to the resources within St. Marks NWR while providing a long-term public amenity to the Northwest Florida community. The project would benefit public health and safety, conservation

of wildlife and habitats, and recreational value.
Project Activities and Implementation Details
Project activities include planning, design, construction of amenities, and associated monitoring activities. The project would be completed in approximately three years. Year 1 would include planning, design, and permitting of the amenities. Years 2 and 3 would include construction activities.
Maintenance
Inspection and maintenance of amenities in the short- and long-term would include inspection and maintenance of the constructed features to ensure proper function and safety and in the long-term, could include actions such as replacement of pilings, boards, and stringers.
Project Monitoring
Project monitoring details are provided in the project MAM plan found in Appendix B.
Costs
The estimated costs are $1,200,000 and include planning, design, construction, monitoring, oversight, and contingency costs.

Figure 2-35 REC11, St. Marks National Wildlife Refuge Coastal Trail Connection, Spring Creek to Port Leon: General Project Location



Chapter 3 OPA Evaluation of Reasonable Range of Alternatives

The FL TIG developed a reasonable range of restoration alternatives for consideration and evaluation under OPA and NEPA in this RP/EA. The screening process to identify the reasonable range of alternatives and project descriptions are described in Chapter 2. The projects are listed in Table 2-2 and mapped in Figure 1-1.

This chapter provides an OPA analysis of each restoration project in this RP/EA including an evaluation of the project's consistency with OPA NRDA regulatory criteria. Sections 3.2-3.5 include the OPA evaluations for each project by Restoration Type, as follows:

- Habitat Projects on Federally Managed Lands: six alternatives (Section 3.2);
- Nutrient Reduction: three alternatives (Section 3.3);
- Water Quality: 12 alternatives (Section 3.4); and
- Provide and Enhance Recreational Opportunities: 11 alternatives (Section 3.5).

3.1 Overview of OPA Evaluation of Restoration Alternatives

According to the OPA NRDA regulations, trustees are to identify a reasonable range of alternatives (15 CFR §990.53(a)(2)) that can be evaluated according to OPA NRDA regulatory evaluation criteria (15 CFR §990.54). Chapter 2 describes the screening process the FL TIG conducted to develop a reasonable range of alternatives. The OPA NRDA regulations (15 CFR §990.54) provide criteria to be used to evaluate the reasonable range of alternatives and identify preferred restoration alternatives. This chapter includes the FL TIG's evaluation of the alternatives in accordance with the OPA NRDA regulations, which include:

- **The cost to carry out the alternative** (Cost-effectiveness). This criterion considers whether the cost to carry out the alternative is reasonable, appropriate, and comparable to other similar restoration alternatives. The FL TIG considered the estimated cost of the alternative, including, if appropriate, the costs for design, planning, permitting, construction, oversight and management, and monitoring and maintenance.

- **Trustee goals and objectives** (Goals and objectives). This criterion considers the extent to which each alternative is expected to meet the Trustees' goals and objectives in returning the injured natural resources and services to baseline and/or compensating for interim losses (the ability of the project to provide comparable resources and services; that is, the nexus between the project and the injury). This encompasses the PDARP/PEIS programmatic Restoration Goals and Restoration Types (Section 5.3.1 of the PDARP/PEIS). For example, for recreational use alternatives, the FL TIG evaluated the nature, magnitude, and distribution of recreational use

benefits expected to be provided to the public (e.g., nature and scale of anticipated benefits from the alternative and its location and accessibility to the public).

- **Likelihood of success**. This criterion includes consideration of each project's likelihood of success such as whether the alternative proposes approaches or techniques that have been executed successfully in the past; whether the approach or technique is routinely employed; and whether there are significant impediments to successful implementation and/or realization of the project benefits (e.g., local support for a project, willingness of a landowner to participate, potential regulatory compliance issues).

- **Prevents future injury and avoids collateral injury** (Avoid collateral injury). This criterion evaluates the extent to which an alternative would prevent future injury as a result of the incident, and/or avoid collateral injury as a result of implementing the alternative. None of the alternatives considered in this RP/EA prevent future injuries from the incident. Instead, for this OPA evaluation, the FL TIG focused on whether the restoration alternative has the potential to cause direct or indirect collateral environmental injuries. For projects proposed for full implementation (not those limited to P&D activities), these considerations are covered in more detail in the environmental consequences sections of Chapter 4.

- **Benefits multiple natural resources/services** (Benefits). This criterion evaluates the extent to which an alternative would provide benefits to more than one natural resource and/or service. This includes whether the project benefits would make the alternative more valuable to the public (e.g., by providing both recreational and ecological benefits).

- **Effects on public health and safety** (Health and safety). This criterion evaluates whether any aspect of the alternative could affect public health and/or safety. This evaluation includes consideration of both positive and negative impacts that cannot be mitigated.

3.2 OPA Evaluation: Habitat Projects on Federally Managed Lands Alternatives

Table 3-1 provides an evaluation of the consistency with OPA criteria for each of the projects in the reasonable range of alternatives consistent with the Restore and Conserve Habitat Restoration Goal and underlying Habitat Projects on Federally Managed Lands Restoration Type. Additional information on Habitat Projects on Federally Managed Lands alternatives is provided in section 2.5.1.

Table 3-1 Evaluation of OPA criteria for the Habitat Projects on Federally Managed Lands alternatives

ALTERNATIVES	OPA EVALUATION
FM1, Gulf Islands National Seashore (Florida) Beneficial Use of Dredged Materials at Perdido Pass	*Cost-effectiveness*: The estimated cost of $4,783,847 includes compliance surveys, implementation of sand placement, monitoring, and oversight. It is not feasible to fully fund the project with the funds available to the FL TIG. Efficiencies could be achieved by cost sharing between this project and the dredging portion of the project; however, the dredging portion of the project cannot take place at this time due to USACE's schedule. *Goals and objectives*: This project would be consistent with the Restore and Conserve Habitat Restoration Goal and underlying Habitat Projects on Federally Managed Lands Restoration Type. This project would improve and increase beach habitat on the Gulf-side of Perdido Key. This project would have a clear nexus to injuries as GUIS habitat was directly injured by oiling and/or response activities associated with the DWH oil spill. *Likelihood of success*: A similar project, utilizing the same sand placement methods, was completed at Perdido Key between 2011-2012. However, the timing for this project is not consistent with USACE's plans for dredging of Perdido Pass. Therefore, this project is unlikely to be feasible at this time. *Avoid collateral injury*: This project would not likely cause collateral injury to natural resources. During implementation, activities would be conducted according to conditions outlined in a biological opinion to avoid or minimize impacts to sea turtles, birds, and marine mammals. *Benefits*: The primary benefit of this project would be improvement of beach habitat. This project would address the unnaturally eroding beach by re-introducing sand into the barrier island system along the southeast shore of Perdido Key. With episodic overwash events, it should also increase sandy habitat elsewhere on Perdido Key, north of the primary dune line. This project would provide benefits to a range of wildlife species that utilize the habitat and would also restore popular recreational areas for local visitors and tourists. *Health and safety*: The FL TIG does not anticipate impacts to public health and safety. USACE requires that contractors develop a safety plan for all project activities. *Summary*: Based on the OPA evaluation, specifically the cost-effectiveness and likelihood of success, this project was not identified as a preferred restoration alternative by the FL TIG at this time.

FM2, Gulf Islands National Seashore (Florida) Night Sky Restoration (P&D; preferred)	*Cost-effectiveness*: The estimated cost of $432,093 includes P&D, support personnel, equipment, monitoring, coordination, reporting, and administrative oversight. The costs are based on similar projects, DOI's experience, and, in the judgment of the FL TIG, are reasonable and appropriate. *Goals and objectives*: This project is consistent with the Restore and Conserve Habitat Restoration Goal and underlying Habitat Projects on Federally Managed Lands Restoration Type. This project would provide valuable information to the FL TIG on the most effective approach to reduce artificial lighting on GUIS - see FM3, Gulf Islands National Seashore (Florida) Night Sky Restoration (Implementation). This would allow the FL TIG to plan accordingly to restore habitat for nesting sea turtles and birds on GUIS. This project has a clear nexus to injuries as the GUIS habitat was directly injured by oiling and/or response activities associated with the DWH oil spill. *Likelihood of success*: This project includes only P&D activities that are highly likely to be successful in helping the FL TIG identify approaches for a future implementation phase (see FM3). Further, based on similar efforts through two DWH-funded projects, the NRDA Early Restoration Phase II project: Improving Habitat Injured by Spill Response: Restoring the Night Sky project and the GEBF project: Eliminating Light Pollution at Sea Turtle Nesting Beaches (Phase II) project, the FL TIG anticipates this project would have a high likelihood of success. *Avoid collateral injury*: This is a P&D project and is not expected to cause collateral injury to natural resources. This project would include an assessment of artificial lighting, development of a strategy to improve problematic lighting, and a report with recommendations; these are all activities that pose no direct or indirect risk of injury to the environment. *Benefits*: The primary benefit of this project is to provide planning information to the FL TIG for a future implementation phase (see FM3). Reducing light pollution has the potential to benefit other species on federally managed lands in Florida. In addition to sea turtles, studies have demonstrated potential benefits of reduced light pollution on beach mice (Bird et al., 2004), sea birds (Montevecchi, 2006), and a diverse range of other marine and terrestrial species (Longcore and Rich, 2004; Gaston et al., 2013). *Health and safety*: This is a P&D project. As such, the FL TIG does not anticipate any impacts to public health and safety. *Summary*: Based on the OPA evaluation, this project was identified as a tentative preferred restoration alternative in this RP/EA.

FM3, Gulf Islands National Seashore (Florida) Night Sky Restoration (Implementation)	*Cost-effectiveness*: The estimated cost of $7,669,834 includes program oversight and management; design and installation of lighting upgrades, supplies, oversight and management, and contingency costs. The costs would depend greatly on Phase I findings, specifically the results of the lighting inventory and the sky brightness measurements and the number and location of willing municipalities, businesses, and private citizens - see the FM2, Gulf Islands National Seashore (Florida) Night Sky Restoration (P&D) project. However, the costs are consistent with similar projects, DOI's experience, and, in the judgment of the FL TIG, are reasonable and appropriate. *Goals and objectives*: This project is consistent with the Restore and Conserve Habitat Restoration Goal and underlying Habitat Projects on Federally Managed Lands Restoration Type. As the implementation phase (Phase II) of the FM2, Gulf Islands National Seashore (Florida) Night Sky Restoration project, this project would enhance Florida's coastal habitats and reduce negative impacts of lighting on wildlife including sea turtles and birds. This project has a clear nexus to injuries as it would address GUIS habitats and species that were directly injured by oiling and/or response activities associated with the DWH oil spill. *Likelihood of success*: This project includes reliable methods to reduce artificial lighting such as lighting upgrades and enhancement of lighting practices. Similar efforts are ongoing through two DWH-funded projects, the NRDA Early Restoration Phase II project: Improving Habitat Injured by Spill Response: Restoring the Night Sky project and the GEBF project: Eliminating Light Pollution at Sea Turtle Nesting Beaches (Phase II) project. Further, Phase I of this project (see FM2), which only includes P&D activities to identify priority locations and develop a strategy for implementation, would be conducted prior to Phase II. Therefore, the FL TIG anticipates this project would have a high likelihood of success. *Avoid collateral injury*: This project focuses on mitigating the negative impacts of lighting on wildlife and is not expected to cause collateral injury to natural resources. *Benefits*: The primary benefit of this project is to reduce the negative impacts of lighting and sky glow on beach and dune areas in or near GUIS. This project would focus on eliminating the most damaging sources of light pollution and using alternative lighting solutions to reduce negative impacts on wildlife including, but not limited to, sea turtles, birds, and beach mice. This project would also mitigate negative impacts on species migration and impacts on dispersal and settlement of marine invertebrate larvae. *Health and safety*: The FL TIG does not anticipate impacts to public health and safety. This project would provide a greater margin of safety for potential public health effects by improving public night vision performance. *Summary*: Based on the OPA evaluation, specifically the cost-effectiveness and likelihood of success (conducting FM2 prior to this project), this project was not identified as a preferred alternative by the FL TIG at this time.

FM4, Gulf Islands National Seashore (Florida) Beach and Dune Habitat Protection (preferred)	*Cost-effectiveness*: The estimated cost of $853,821 includes oversight and management, labor, compliance activities, enforcement, supplies, vehicles, and contingency costs. The estimated costs are based on similar projects to restore and protect beach and dune habitat, DOI's experience, and, in the judgment of the FL TIG, are reasonable and appropriate. *Goals and objectives*: This project is consistent with the Restore and Conserve Habitat Restoration Goal and underlying Habitat Projects on Federally Managed Lands Restoration Type. This project would protect beach habitat and associated wildlife at GUIS. This project has a clear nexus to injuries as the GUIS habitat was directly injured by oiling and/or response activities associated with the DWH oil spill. *Likelihood of success*: This project utilizes standard approaches to protect beach and dune habitat such as the use of fencing and other predator management activities, enforcement patrol support, and public outreach materials to successfully protect sensitive habitats and resources. Based on similar efforts through three DWH-funded projects, the DWH Early Restoration Phase II project: Enhanced Management of Avian Breeding Habitat Injured by Response in the Florida Panhandle, Alabama, and Mississippi, the GEBF project: Comprehensive Panhandle Coastal Bird Conservation, and the GEBF project: Restoring Florida's Shorebird & Seabird Populations – Phase I, the FL TIG anticipates this project would have a high likelihood of success. *Avoid collateral injury*: This project focuses on the restoration of beach and dune habitat and is not expected to cause collateral injury to natural resources. Established protocols and methods for temporary fencing and predator management would be used to avoid incidental mortality. *Benefits*: The primary benefit of this project is to protect and restore dunes and beaches that provide important coastal habitat for birds, beach mice, and sea turtles, allowing the habitat to recover its natural vegetation and processes with as little disturbance as possible. This project would also serve to restore popular recreational areas for local visitors and tourists by installing and enforcing temporary access limitations such as fences and vehicular speed signs. These techniques would improve habitat connectivity and reduce visitor impacts on habitats and wildlife. *Health and safety*: The FL TIG does not anticipate impacts to public health and safety since this project would be implemented by licensed and trained NPS staff. Further, the law enforcement patrols to monitor and control vehicle speeding rates would not only reduce collisions with wildlife but also increase safety for visitors to GUIS. *Summary*: Based on the OPA evaluation, this project was identified as a tentative preferred restoration alternative in this RP/EA.

FM5, Gulf Islands National Seashore (Florida) Invasive Plant Removal (preferred)	*Cost-effectiveness*: The estimated cost of $875,765 includes planning, personnel support, supplies, vehicular support, and oversight. The estimated costs are based on similar projects to map and treat invasive species, DOI's experience, and, in the judgment of the FL TIG, are reasonable and appropriate. *Goals and objectives*: This project is consistent with the Restore and Conserve Habitat Restoration Goal and underlying Habitat Projects on Federally Managed Lands Restoration Type. This project would protect and enhance habitat within GUIS through invasive species management. This project has a clear nexus to injuries as GUIS habitat was directly injured by oiling and/or response activities associated with the DWH oil spill. *Likelihood of success*: This project includes standard approaches to map and treat invasive species, adaptively use information for future treatment efforts, and develop a comprehensive TAP. Using this adaptive approach, the FL TIG anticipates this project would have a high likelihood of success. *Avoid collateral injury*: This project is focused on the treatment of invasive species to enhance GUIS habitat and is not expected to cause collateral injury to natural resources. Non-target species would be avoided to the extent practicable. Chemical treatments would be used when other methods are insufficient alone or impractical. During mechanical and chemical treatments, BMPs would be applied to minimize the likelihood and extent of impacts. *Benefits*: The primary benefit of this project is to protect and conserve habitat through the treatment of five of the most problematic invasive plant species in the area. This project would include collection of information on the species that would help the park continue to protect and conserve the native habitats and a range of wildlife that utilize the habitats and resources. *Health and safety*: The FL TIG does not anticipate impacts to public health and safety. Licensed applicators would apply label restrictions as required by law and as labeled for aquatic or terrestrial use, following appropriate protocols and agency guidance for public notification and safety. *Summary*: Based on the OPA evaluation, this project was identified as a tentative preferred restoration alternative in this RP/EA.

FM6 **St. Vincent National Wildlife Refuge Predator Control (preferred)**	*Cost-effectiveness*: The estimated cost of $580,772 includes planning, permitting, support personnel, equipment, monitoring, coordination, reporting, and administrative oversight. The costs are based on similar predator control projects, DOI's experience on other national wildlife refuges and parks, and, in the judgment of the FL TIG, are reasonable and appropriate. *Goals and objectives*: This project is consistent with the Restore and Conserve Habitat Restoration Goal and underlying Habitat Projects on Federally Managed Lands Restoration Type. This project would protect and conserve habitat through predator control actions to mitigate the negative impacts of feral hogs and raccoons on habitats and resources. This project has a clear nexus to injuries from the DWH oil spill by protecting and conserving habitat on St. Vincent NWR, federally managed lands directly impacted by the DWH oil spill. *Likelihood of success*: This project includes planning, implementation of predator control mechanisms, and monitoring of species populations (predators, sea turtles, and shorebirds). The implementing Trustee and project partners, including DOI, NWR staff, and USDA-APHIS-WS staff have expertise in predator control activities and have successfully implemented similar projects in the past, including the DWH Early Restoration Phase II project: Enhanced Management of Avian Breeding Habitat Injured by Response in the Florida Panhandle, Alabama, and Mississippi project. As such, the FL TIG anticipates this project would have a high likelihood of success. *Avoid collateral injury*: This project focuses on mitigating the negative impacts of feral hogs and raccoons on the habitat and resources in St. Vincent NWR and is not expected to cause collateral injury to natural resources. The methods for this project have been carefully chosen to avoid impacting non-target wildlife and protected species (e.g., red wolf). Established protocols and methods for predator management would be used to avoid incidental mortality. *Benefits*: The primary benefit of this project is to protect and conserve habitat through predator control. However, by controlling and reducing impacts of predators on habitat and wildlife, this project would result in benefits to multiple resources including improving shorebird and sea turtle nesting success, reducing impacts to habitats and threatened and endangered species, and reducing the spread of invasive species on the NWR. *Health and safety*: The FL TIG does not anticipate impacts to public health and safety. The St. Vincent NWR staff and USDA-APHIS-WS staff are highly qualified to conduct predator control activities. Further, the methods used for the removal of feral hogs will follow the American Veterinary Medical Guidelines for the Euthanasia of Animals (2013). *Summary*: Based on the OPA evaluation, this project was identified as a tentative preferred restoration alternative in this RP/EA.

3.3 OPA Evaluation: Nutrient Reduction Alternatives

Table 3-2 provides an evaluation of the consistency with OPA criteria for each of the projects in the reasonable range of alternatives consistent with the Restore Water Quality Restoration Goal and the underlying Nutrient Reduction Restoration Type. Additional information on the Nutrient Reduction alternatives is provided in section 2.5.2.

Table 3-2 Evaluation of OPA criteria for the Nutrient Reduction alternatives

ALTERNATIVES	OPA EVALUATION
NR1, Pensacola Bay and Perdido River Watersheds - Nutrient Reduction (preferred)	*Cost-effectiveness*: The estimated cost of $2,100,000 includes planning, compliance, engineering, permitting, implementation, monitoring, maintenance, oversight, and contingency costs. The approaches for this project have been applied extensively across the country, and the costs are well-documented. Costs are based on USDA's expertise and experience, and, in the judgment of the FL TIG, are reasonable and appropriate. *Goals and objectives*: This project is consistent with the Restore Water Quality Restoration Goal and underlying Nutrient Reduction Restoration Type and has a clear nexus to injuries. This project would improve water quality in coastal watersheds that were injured by the DWH oil spill, including Pensacola Bay and Perdido River watersheds, by reducing sediment and nutrient loads through the implementation of CPs on agricultural lands. *Likelihood of success*: This project includes planning for and implementation of standard agricultural CPs that the USDA has successfully implemented numerous times in Florida. Although the likelihood of success would depend on the identification of willing landowners, USDA-NRCS does not anticipate any difficulties implementing an outreach strategy that would result in demand for technical and financial assistance offered in this project. Further contributing to the likelihood of success, a monitoring program would be implemented to document changes to water quality and identify whether any adaptive management actions are needed to achieve nutrient reduction goals. *Avoid collateral injury*: The implementation of agricultural CPs would contribute to healthier and more resilient downstream coastal ecosystems that were injured by the DWH oil spill. Therefore, the FL TIG does not expect any collateral injury to other natural resources. *Benefits*: The primary benefit of this project is to improve water quality. Specifically, this project is intended to reduce impacts of sediments and nutrients within the Pensacola Bay and Perdido River watersheds on instream habitats that have direct connectivity to marine resources that utilize the river. This project would also result in additional ecosystem benefits, including enhancing overall marine and estuarine ecological health and nearshore habitats and species, increasing resiliency in coastal ecosystems, reducing chronic threats (e.g., hypoxia, harmful algal blooms), and enhancing recreational uses. *Health and safety*: The FL TIG does not anticipate impacts to public health and safety. This project and associated CPs would not create any new risks for agricultural workers or pose any threats to air or water quality. Reduction of bacterial contaminants in surface waters would be a public health benefit. *Summary*: Based on the OPA evaluation, this project was identified as a tentative preferred restoration alternative in this RP/EA.

NR2, Apalachicola Bay Watershed - Nutrient Reduction	*Cost-effectiveness*: The estimated cost of $3,150,000 includes planning, engineering, permitting, implementation, monitoring and maintenance activities, oversight, and contingency costs. The approaches for this project have been applied extensively across the country, and the costs are well-documented. Costs are based on USDA's expertise and experience, and, in the judgment of the FL TIG, are reasonable and appropriate. *Goals and objectives*: This project is consistent with the Restore Water Quality Restoration Goal and underlying Nutrient Reduction Restoration Type and has a clear nexus to injuries. This project would improve water quality in coastal watersheds that were injured by the DWH oil spill, including Upper Dry Creek-Chipola River, Lower Dry Creek-Chipola River, and Alligator Creek-Holmes Creek, by reducing sediment and nutrient loads through the implementation of CPs on agricultural lands. This watershed has lower agricultural production for agricultural nutrient reduction than the other two alternatives in this RP/EA (see NR1, Pensacola Bay and Perdido River Watersheds - Nutrient Reduction and NR3, Lower Suwannee River Watershed - Nutrient Reduction). Therefore, while yielding positive impacts, this project is expected to be less beneficial than NR1 and NR3 because it would offer fewer opportunities for implementing nutrient reduction measures. As such, this project was not prioritized by the FL TIG at this time. *Likelihood of success*: See Likelihood of success under NR1, Pensacola Bay and Perdido River Watersheds - Nutrient Reduction. *Avoid collateral injury*: See Avoid collateral injury under NR1, Pensacola Bay and Perdido River Watersheds - Nutrient Reduction. *Benefits*: The primary benefit of this project is to improve water quality. Specifically, this project is intended to reduce impacts of sediments and nutrients within the Apalachicola Bay watershed on instream habitats that have direct connectivity to marine resources that utilize the Apalachicola River. Additional ecosystem services that would result from this project include reducing chronic threats (e.g., hypoxia, harmful algal blooms) and improving recreational uses. *Health and safety*: See Health and safety under NR1, Pensacola Bay and Perdido River Watersheds - Nutrient Reduction. *Summary*: Based on the OPA evaluation, specifically the goals and objectives, this project was not identified as a preferred alternative by the FL TIG at this time.

NR3, Lower Suwannee River Watershed - Nutrient Reduction (preferred)	*Cost-effectiveness*: The estimated cost of $3,150,000 includes planning, compliance, engineering, permitting, implementation, monitoring, maintenance, oversight, and contingency costs. The approaches for this project have been applied extensively across the country, and the costs are well-documented. Costs are based on USDA's expertise and experience, and, in the judgment of the FL TIG, are reasonable and appropriate. *Goals and objectives*: This project is consistent with the Restore Water Quality Restoration Goal and underlying Nutrient Reduction Restoration Type and has a clear nexus to injuries. This project would improve water quality in coastal watersheds that were injured by the DWH oil spill, including Long Pond Slough, Long Pond, and Manatee Springs, by reducing sediment and nutrient loads through the implementation of CPs on agricultural lands. *Likelihood of success*: See Likelihood of success under NR1, Pensacola Bay and Perdido River Watersheds - Nutrient Reduction. *Avoid collateral injury*: See Avoid collateral injury under NR1, Pensacola Bay and Perdido River Watersheds - Nutrient Reduction. *Benefits*: The primary benefit of this project is to improve water quality. Specifically, this project is intended to reduce impacts of sediments and nutrients within the upper tributaries of the lower Suwannee River on instream habitats that have direct connectivity to marine resources that utilize the river. This project would also result in additional ecosystem benefits, including enhancing overall marine and estuarine ecological health and nearshore habitats and species, increasing resiliency in coastal ecosystems, reducing chronic threats (e.g., hypoxia, harmful algal blooms), and enhancing recreational uses. *Health and safety*: See Health and safety under NR1, Pensacola Bay and Perdido River Watersheds - Nutrient Reduction. *Summary*: Based on the OPA evaluation, this project was identified as a tentative preferred restoration alternative in this RP/EA.

3.4 OPA Evaluation: Water Quality Alternatives

Table 3-3 provides an evaluation of the consistency with OPA criteria for each of the projects in the reasonable range of alternatives consistent with the Restore Water Quality Restoration Goal and the underlying Water Quality Restoration Type. Additional information on the Water Quality alternatives is provided in section 2.5.3.

Table 3-3 Evaluation of OPA criteria for the Water Quality alternatives

ALTERNATIVES	OPA EVALUATION
WQ1, Carpenter Creek Headwaters Water Quality Improvements (preferred)	*Cost-effectiveness*: The estimated cost of $1,689,900 includes engineering and design, permitting, construction, monitoring, local sponsor oversight, and administration. The estimated costs are based on similar projects, consistent with FDEP's experience, and, in the judgement of the FL TIG, are reasonable and appropriate. *Goals and objectives*: This project is consistent with the Restore Water Quality Restoration Goal and underlying Water Quality Restoration Type and has a clear nexus to the injuries. This project would directly reduce pollution and hydrologic degradation to coastal wetlands by restoring wetlands and constructing a stormwater pond that would reduce erosion as well as sediments, nutrients, and other pollutions associated with stormwater runoff, in watersheds injured by the DWH oil spill. *Likelihood of success*: This project includes standard approaches to wetland restoration and construction of stormwater ponds that have been utilized successfully by FDEP and project partners in the past. The FL TIG anticipates this project would have a high likelihood of success. *Avoid collateral injury*: This project focuses on wetland restoration and stormwater pond construction. Construction and restoration activities would be designed to avoid collateral injury; as such, the FL TIG does not anticipate any collateral injury to other natural resources. *Benefits*: The primary benefit of this project is to improve water quality. However, this project would also result in benefits to estuarine-dependent water column resources, oysters, and SAV in Pensacola Bay. Further, the water quality benefits would also enhance recreational uses in the area, including those described for the recreational use component of this project (REC4, Carpenter Creek Headwaters Park Amenities). *Health and safety*: The FL TIG does not anticipate impacts to public health and safety. In particular, improvements in water quality would have benefits for public health. *Summary*: Based on the OPA evaluation, this project was identified as a tentative preferred restoration alternative in this RP/EA.

WQ2, Pensacola Beach Reclaimed Water System Expansion (preferred)	*Cost-effectiveness*: The estimated cost of $4,683,404 includes implementation of Phases I-IV to construct pumping facilities and reuse transmission and distribution lines, oversight, and contingency costs. The cost estimate is based on a 30-percent design for the project. The estimated costs are consistent with FDEP's experience and the project design and, in the judgement of the FL TIG, are reasonable and appropriate. *Goals and objectives*: This project is consistent with the Restore Water Quality Restoration Goal and underlying Water Quality Restoration Type and has a clear nexus to the injuries. This project would directly improve water quality in watersheds injured by the DWH oil spill by reducing nutrient and other pollutant loading to Santa Rosa Sound. *Likelihood of success*: This project includes constructing pumping facilities and reuse transmission and distribution lines using approaches that have been successfully implemented by FDEP and project partners in other similar projects in Florida. The FL TIG anticipates this project would have a high likelihood of success. *Avoid collateral injury*: This project focuses on construction in the existing right-of-way for transmission and distribution lines. Activities would employ appropriate measures to avoid collateral injury; as such, the FL TIG does not anticipate any collateral injury to other natural resources. *Benefits*: The primary benefit of this project is to improve water quality through reduced nutrient and other pollutant loading to Santa Rosa Sound, which is impaired for bacteria. Additional benefits of this project would include the conservation of potable water and reduced demand on the Sand-and-Gravel aquifer, ECUA's drinking water source. Mitigating hydrologic and water quality degradation in coastal watersheds along the Florida coast would reduce the occurrence of chronic threats to coastal and nearshore habitats and provide improved recreational use opportunities. The water quality improvements due to reduced wastewater discharge to surface waters, could also improve and expand SAV. Further, fertilizer use on Santa Rosa Island may be reduced because of the nutrients available in reclaimed water. *Health and safety*: The FL TIG does not anticipate impacts to public health and safety. In particular, improvements in water quality would have benefits for public health. *Summary*: Based on the OPA evaluation, this project was identified as a tentative preferred restoration alternative in this RP/EA.

WQ3, Rattlesnake Bluff Road and Riverbank Restoration (preferred)	*Cost-effectiveness*: The estimated cost of $3,149,091 includes feasibility studies, engineering and design, permitting, construction, operation and maintenance, monitoring, oversight, and contingency costs. The costs are based on similar projects, FDEP's experience, and, in the judgement of the FL TIG, are reasonable and appropriate. *Goals and objectives*: This project is consistent with the Restore Water Quality Restoration Goal and underlying Water Quality Restoration Type and has a clear nexus to the injuries. This project would directly reduce pollution and hydrologic degradation to coastal wetlands by installing erosion and sediment controls in watersheds injured by the DWH oil spill. This project would improve water quality by mitigating the impacts of excessive sedimentation to the Yellow River and Pensacola Bay. *Likelihood of success*: This project includes standard construction practices and approaches for culvert replacement, bank and road stabilization, and water quality monitoring. The FL TIG anticipates this project would have a high likelihood of success. *Avoid collateral injury*: This is project is not expected to cause collateral injury to natural resources. This project focuses on stabilizing roads and replacing deteriorating and/or inadequate culverts in Santa Rosa and Okaloosa counties. *Benefits*: The primary benefit of this project is to improve water quality. However, this project would also benefit estuarine-dependent water column resources, oysters, and SAV, and mitigate chronic ecosystem threats such as habitat degradation and impacts to recreational use. *Health and safety*: The FL TIG does not anticipate impacts to public health and safety. In particular, improvements in water quality would have benefits for public health. *Summary*: Based on the OPA evaluation, this project was identified as a tentative preferred restoration alternative in this RP/EA.

WQ4, Pensacola Bay Unpaved Roads Initiative (P&D; preferred)	*Cost-effectiveness*: The estimated cost of $705,473 includes P&D, evaluation, modeling, monitoring, field reconnaissance, and oversight and management. The costs are based on similar projects, FDEP's experience, and, in the judgement of the FL TIG, are reasonable and appropriate. *Goals and objectives*: This project is consistent with the Restore Water Quality Restoration Goal and underlying Water Quality Restoration Type and has a clear nexus to the injuries. If implemented, this project would reduce erosion and transport of sediment downstream and improve water quality in Pensacola Bay, a watershed impacted by the DWH oil spill. *Likelihood of success*: This project includes P&D activities to inventory unpaved roads and identify priority sites where unpaved roads are negatively affecting the Pensacola Bay watershed. FDEP has conducted similar planning efforts successfully in the past, including the ongoing GEBF project: Water Quality Improvements to Enhance Fisheries Habitat in the Lower Choctawhatchee River Basin – Phase I. The FL TIG anticipates this project would have a high likelihood of success. *Avoid collateral injury*: This is a P&D project and is not expected to cause collateral injury to natural resources. This project focuses on evaluation and modeling of unpaved roads and development of 30 percent design plans; these activities pose no direct or indirect risk of injury to the environment. *Benefits*: The primary benefit of this project is to provide valuable information for the FL TIG to use in future restoration planning efforts. If implemented, this project would reduce erosion and the transport of sediment downstream, improve water quality, enhance coastal habitats and resources, and enhance the recreational use of those resources (i.e., swimming and fishing). *Health and safety*: This is a P&D project. As such, the FL TIG does not anticipate impacts to public health and safety. If implemented, the improvements in water quality would have benefits for public health. *Summary*: Based on the OPA evaluation, this project was identified as a tentative preferred restoration alternative in this RP/EA.

WQ5, Alligator Lake Coastal Dune Lake Hydrologic Restoration (preferred)	*Cost-effectiveness*: The estimated cost of $1,382,400 includes construction, engineering and inspection, and administrative oversight. The cost estimate is based on a 60 percent design for the project. The costs are consistent with FDEP's experience and the project design, and, in the judgement of the FL TIG, are reasonable and appropriate. *Goals and objectives*: This project is consistent with the Restore Water Quality Restoration Goal and underlying Water Quality Restoration Type and has a clear nexus to the injuries. This project would improve water quality in watersheds injured by the DWH oil spill. Further, the project would restore hydrologic connections between the estuarine and freshwater portions of Alligator Lake and enhance coastal habitats injured by the DWH oil spill. *Likelihood of success*: This project includes standard construction of a bridge to improve water quality in Alligator Lake. The FL TIG anticipates this project would have a high likelihood of success. *Avoid collateral injury*: This project focuses on replacing culverts to restore hydrologic connections and improve water quality. This project would be engineered and implemented to avoid collateral injury; therefore, the FL TIG does not expect any collateral injury to other natural resources. *Benefits*: The primary benefit of this project is to improve water quality. However, this project would also benefit wildlife as the culverts currently act as barriers to fish and wildlife movement and reduce water and sediment exchange. The bridge across Alligator Lake would restore tidal exchange and remove these barriers. Long-term benefits to the resources and services injured by the DWH oil spill would include improved health and resilience of coastal and marine habitats and resources. *Health and safety*: The FL TIG does not anticipate impacts to public health and safety. In particular, the improvement in water quality would have benefits for public health. *Summary*: Based on the OPA evaluation, this project was identified as a tentative preferred restoration alternative in this RP/EA.

WQ6, Grand Lagoon Regional Stormwater Facility	*Cost-effectiveness*: The estimated cost of $3,210,910 includes planning, design, permitting, implementation, monitoring, and administrative oversight. The costs are consistent with FDEP's experience with similar projects, and, in the judgement of the FL TIG, are reasonable and appropriate. *Goals and objectives*: This project is consistent with the Restore Water Quality Restoration Goal and underlying Water Quality Restoration Type and has a clear nexus to the injuries. This project would directly improve water quality in watersheds injured by the DWH oil spill by reducing point and nonpoint source pollution from reaching Grand Lagoon, which is part of the St. Andrew Bay watershed which has a direct connection to the Gulf of Mexico. *Likelihood of success*: This project includes developing a stormwater treatment facility using approaches that have been successfully implemented by FDEP in other similar projects across Florida. However, land would need to be acquired from willing sellers, with sufficient acreage and in the right location, to allow construction of the stormwater treatment facilities. It is unknown, at this time, whether such land could be acquired. *Avoid collateral injury*: This project focuses on constructing a stormwater treatment facility and retention pond. Construction activities would employ appropriate measures to avoid collateral injury; as such, the FL TIG does not anticipate any collateral injury to other natural resources. *Benefits*: The primary benefit of this project is to improve water quality in Grand Lagoon and, in turn, the Gulf of Mexico. This project would also result in additional ecological benefits to coastal habitats and recreational uses of the resources and habitats (i.e., swimming and fishing). *Health and safety*: The FL TIG does not anticipate impacts to public health and safety. In particular, improvements in water quality would have benefits for public health. *Summary*: Based on the OPA evaluation, specifically the likelihood of success, this project was not identified as a preferred alternative by the FL TIG at this time.

WQ7, St. Andrew Bay Unpaved Roads Initiative (P&D)	*Cost-effectiveness*: The estimated cost of $705,473 includes P&D, evaluation, modeling, monitoring, field reconnaissance, and oversight and management. The costs are based on similar projects, FDEP's experience, and, in the judgement of the FL TIG, are reasonable and appropriate. *Goals and objectives*: This project is consistent with the Restore Water Quality Restoration Goal and underlying Water Quality Restoration Type and has a clear nexus to the injuries. If implemented, this project would reduce erosion and transport of sediment downstream and improve water quality in a watershed impacted by the DWH oil spill through mitigating the adverse effects of unpaved roads. Based on the results of an inventory conducted to identify unpaved roads in 16 northwest Florida counties, Pensacola Bay was identified as the watershed with the second largest number of unpaved, county-maintained roads, after the Choctawhatchee Bay Watershed. A similar study for Choctawhatchee Bay is currently being funded with GEBF funds. Due to this, the FL TIG believes Pensacola Bay is a higher priority watershed compared to St. Andrew Bay for this type of restoration activity. Therefore, while addressing unpaved roads in St. Andrew Bay watershed would yield positive impacts, this project is expected to be less beneficial than the WQ4, Pensacola Bay Unpaved Roads Initiative. As such, this project was not prioritized by the FL TIG at this time. *Likelihood of success*: See Likelihood of success under WQ4, Pensacola Bay Unpaved Roads Initiative. *Avoid collateral injury*: See Avoid collateral injury under WQ4, Pensacola Bay Unpaved Roads Initiative. *Benefits*: See Benefits under WQ4, Pensacola Bay Unpaved Roads Initiative. *Health and safety*: See Health and safety under WQ4, Pensacola Bay Unpaved Roads Initiative. *Summary*: Based on the OPA evaluation, specifically the goals and objectives, this project was not identified as a preferred alternative by the FL TIG at this time.

WQ8, City of Port St. Joe Stormwater Improvements (preferred)	*Cost-effectiveness*: The estimated cost of $961,000 includes engineering and design, permitting, construction, monitoring, and administration. The costs are consistent with FDEP's experience with similar projects, and, in the judgement of the FL TIG, are reasonable and appropriate. *Goals and objectives*: This project is consistent with the Restore Water Quality Restoration Goal and underlying Water Quality Restoration Type and has a clear nexus to the injuries. This project would directly improve water quality in watersheds injured by the DWH oil spill by capturing and treating stormwater runoff prior to discharge into St. Joseph Bay. *Likelihood of success*: This project includes engineering and design of SCMs and a treatment pond, approaches that have been successfully implemented by FDEP and project partners in similar projects. The FL TIG anticipates this project would have a high likelihood of success. *Avoid collateral injury*: This project focuses on SCMs and a treatment pond. Construction and restoration activities would be designed to avoid collateral injury; as such, the FL TIG does not anticipate any collateral injury to other natural resources. *Benefits*: The primary benefit of this project is to improve water quality in the watershed and downstream coastal habitats. However, this project would also benefit sensitive and regionally significant SAV beds in St. Joseph Bay that underpin the greater aquatic ecosystem and support important recreational and commercial fisheries. *Health and safety*: The FL TIG does not anticipate impacts to public health and safety. In particular, improvements in water quality would have benefits for public health. *Summary*: Based on the OPA evaluation, this project was identified as a tentative preferred restoration alternative in this RP/EA.

WQ9, MK Ranch Hydrologic Restoration	*Cost-effectiveness*: The estimated cost of $27,484,932 includes planning, design, permitting, implementation, monitoring, and administrative oversight. The cost estimate is based on a 30 percent design for the project. However, engineering cost estimates have not been completed as full restoration of the MK Ranch site would be contingent upon acquisition of the Lake Wimico parcel west of ARWEA, which is not part of the cost estimate above. The costs are consistent with FWC's experience and the project design, and, in the judgement of the FL TIG, while large, are reasonable and appropriate. *Goals and objectives*: This project is consistent with the Restore Water Quality Restoration Goal and underlying Water Quality Restoration Type and has a clear nexus to the injuries. This project would improve water quality in watersheds injured by the DWH oil spill and restore historic wetland structure and function by reconnecting the natural drainage pathways within the watershed. *Likelihood of success*: The success of this project, as it relates to implementation of full restoration of the MK Ranch site, is contingent upon acquisition of the Lake Wimico parcel west of ARWEA. *Avoid collateral injury*: This project includes wetland restoration efforts and the collection of hydrologic and vegetative data. During restoration, there could be minor impacts to surrounding habitats. *Benefits*: The primary benefit of this project is to restore flows and improve hydrologic conditions in the watershed and downstream coastal habitats. *Health and safety*: The FL TIG does not anticipate impacts to public health and safety. In particular, improvements in water quality would have benefits for public health. *Summary*: Based on the OPA evaluation, specifically the likelihood of success, this project was not identified as a preferred alternative by the FL TIG at this time.

WQ10, City of Carrabelle's Lighthouse Estates: Septic Tank Abatement - Phase II (preferred)	*Cost-effectiveness*: The estimated cost of $3,237,986 includes construction, monitoring, evaluation, oversight, and contingency costs. The costs are based on similar projects, FDEP's experience, and, in the judgement of the FL TIG, are reasonable and appropriate. *Goals and objectives*: This project is consistent with the Restore Water Quality Restoration Goal and underlying Water Quality Restoration Type and has a clear nexus to the injuries. This project would directly improve water quality in watersheds injured by the DWH oil spill by reducing the discharge pollutant loading that otherwise would impact the health and quality of estuarine habitats in receiving waters. *Likelihood of success*: This project includes connecting septic systems to the City of Carrabelle's wastewater treatment plant using approaches that have been successfully implemented by FDEP and project partners in other similar projects across Florida. The FL TIG anticipates this project would have a high likelihood of success. *Avoid collateral injury*: This project focuses on connecting septic systems to the wastewater treatment plant. Construction activities would employ appropriate measures to avoid collateral injury; as such, the FL TIG does not anticipate any collateral injury to other natural resources. *Benefits*: The primary benefit of this project is to improve water quality in the watershed and downstream coastal habitats. This project would also have recreational use benefits including helping to reduce the potential for beach closures, restrictions on shellfish harvesting, and human health impacts from microbial pathogens. *Health and safety*: The FL TIG does not anticipate impacts to public health and safety. In particular, improvements in water quality would have benefits for public health. *Summary*: Based on the OPA evaluation, this project was identified as a tentative preferred restoration alternative in this RP/EA.

WQ11, Lower Suwannee National Wildlife Refuge Hydrologic Restoration (P&D; preferred)	*Cost-effectiveness*: The estimated cost of $500,000 includes P&D and oversight and administration. The costs are based on similar projects, DOI's experience, and, in the judgement of the FL TIG, are reasonable and appropriate. *Goals and objectives*: This project is consistent with the Restore Water Quality Restoration Goal and underlying Water Quality Restoration Type and has a clear nexus to the injuries. This project would provide a restoration strategy to help improve hydrologic conditions in the Lower Suwannee NWR area through the compilation and analysis of existing water quality and flow data and hydrologic modeling assessments. *Likelihood of success*: This project only includes P&D activities, including compilation and analysis of existing data and hydrologic modeling assessments to identify locations where culverts, low water crossing, and road removal can be used to restore flows and improve hydrologic conditions. DOI and NWR staff have conducted similar modeling and analysis exercises in the past and expect this project to have a high likelihood of success in providing valuable information for future restoration planning efforts. *Avoid collateral injury*: This is a P&D project and is not expected to cause collateral injury to natural resources. This project focuses on an analysis of existing data and hydrologic modeling; these are all activities that pose no direct or indirect risk of injury to the environment. *Benefits*: The primary benefit of this project is to provide valuable information for future restoration planning efforts. If implemented, this project would restore flows and improve hydrologic conditions in the watershed, restore hydrologic connections and freshwater flows between the NWR and Suwannee River Estuary, enhance coastal habitats impacted by the spill, and subsequently benefit fish and wildlife, such as Gulf sturgeon, oysters, and commercial and recreational fisheries. Increased freshwater flows would also reduce the effects of saltwater intrusion in the lower portion of the NWR. Long-term benefits to the resources and their services injured by the spill would include improved health and resilience of coastal and marine habitats and resources. *Health and safety*: This is a P&D project. As such, the FL TIG does not anticipate impacts to public health and safety. If implemented, the improvements in water quality would have benefits for public health. *Summary*: Based on the OPA evaluation, this project was identified as a tentative preferred restoration alternative in this RP/EA.

WQ12, Lower Charlotte Harbor Flatwoods Hydrologic Restoration Initiative, Yucca Pens Unit (P&D; preferred)	*Cost-effectiveness*: The estimated cost of $636,500 includes P&D, monitoring, and administrative oversight. The costs are based on similar projects, FDEP's experience, and in the judgement of the FL TIG, are reasonable and appropriate. *Goals and objectives*: This project is consistent with the Restore Water Quality Restoration Goal and underlying Water Quality Restoration Type and has a clear nexus to the injuries. If implemented, the project would develop a science-based, data-driven, Strategic Hydrological Planning Tool that would provide guidance to resource management agencies for restoration and management of surface waters flowing from the Cecil Webb/Babcock and Yucca Pens Unit WMAs through tidal creeks and discharging into eastern Charlotte Harbor and the Caloosahatchee River. *Likelihood of success*: This project includes P&D and modeling efforts. FDEP and project partners have conducted similar modeling efforts which have successfully resulted in information beneficial for restoration planning efforts. The FL TIG anticipates this project would have a high likelihood of success. *Avoid collateral injury*: This is a P&D project and is not expected to cause collateral injury to natural resources. This project focuses on modeling and creation of a Strategic Hydrological Planning Tool; these are all activities that pose no direct or indirect risk of injury to the environment. *Benefits*: The primary benefit of this project is to provide valuable information for future restoration planning efforts that, if implemented, would improve water quality and hydrology. This project would also benefit wildlife, coastal habitats, and resources, as well as the recreational use of those habitats (i.e., swimming and fishing). Restoring surface water sheet flow and moderating excessive freshwater discharges would have subsequent benefits to habitats, fish, and wildlife. Long-term benefits to the resources and their services injured by the spill would include improved health and resilience of coastal and marine habitats and resources. *Health and safety*: This is a P&D project. As such, the FL TIG does not anticipate impacts to public health and safety. If implemented, the improvements in water quality would have benefits for public health. *Summary*: Based on the OPA evaluation, this project was identified as a tentative preferred restoration alternative in this RP/EA.

3.5 OPA Evaluation: Provide and Enhance Recreational Opportunities

Table 3-4 provides an evaluation of the consistency with OPA criteria for each of the projects in the reasonable range of alternatives consistent with the Provide and Enhance Recreational Opportunities Restoration Goal and the underlying Provide and Enhance Recreational Opportunities Restoration Type. Additional information on the Provide and Enhance Recreational Opportunities alternatives is provided in section 2.5.4.

Table 3-4 Evaluation of OPA criteria for the Provide and Enhance Recreational Opportunities alternatives

ALTERNATIVES	OPA EVALUATION
REC1, Perdido Bay Sunset Islands Snorkeling Trail	*Cost-effectiveness*: The estimated cost of $840,000 includes planning, design, permitting, and construction, monitoring and maintenance activities, oversight, and contingency costs. The costs are based on Escambia County's experience with breakwaters and, in the judgement of the FL TIG, are reasonable and appropriate. *Goals and objectives*: This project is consistent with the Provide and Enhance Recreational Opportunities Restoration Goal and underlying Provide and Enhance Recreational Opportunities Restoration Type and has a clear nexus to the injuries. The snorkeling path would provide additional recreational opportunities and the educational signage would increase awareness of the area's natural resources. *Likelihood of success*: This project includes P&D and construction of a breakwater and snorkeling trail. While FDEP and Escambia County have experience in constructing breakwaters, neither has experience in the establishment of an underwater snorkeling trail. *Avoid collateral injury*: This project focuses on increasing and enhancing recreational access through the construction of a breakwater and development of a snorkeling trail. Activities would employ appropriate measures to avoid collateral injury; as such, the FL TIG does not anticipate any collateral injury to other natural resources. *Benefits*: The primary benefit of this project is to provide and enhance recreational uses through the development of a snorkeling trail. *Health and safety*: This project could result in potential health and safety concerns related to the snorkeling trail, which would be located in the vicinity of a high-boat traffic area (Intracoastal Waterway). *Summary*: Based on the OPA evaluation, specifically the likelihood of success and health and safety, this project was not identified as a preferred alternative by the FL TIG at this time.

REC2, Tarkiln Bayou Preserve State Park Improvements	*Cost-effectiveness*: The estimated cost of $2,719,670 includes planning, design, permitting, construction, monitoring and maintenance activities, oversight, and contingency costs. The costs are based on similar projects, consistent with FDEP's experience, and, in the judgment of the FL TIG, are reasonable and appropriate. *Goals and objectives*: This project is consistent with the Provide and Enhance Recreational Opportunities Restoration Goal and underlying Provide and Enhance Recreational Opportunities Restoration Type goals and has a clear nexus to the injuries. The enhanced parking area, road improvements, paddle-craft launch, and beach-use area amenities would provide access and enhance visitors' recreational experiences. *Likelihood of success*: This project includes planning and construction of standard park amenities that are likely to be successfully implemented. However, it would be difficult to improve DuPont Road (the access road from the entrance/parking area to the beach-use area) due to hydrologic issues (i.e., sheet water flows) in wet conditions even with enhancements (e.g., low water crossings). Additionally, there are logistical issues with transporting paddle-craft from the entrance/parking area to the end of the boardwalk (approximately one mile in length) to access the paddle-craft launch in Tarkiln Bayou. *Avoid collateral injury*: This project focuses on providing and enhancing recreational opportunities through infrastructure improvements. These improvements are likely to impact the hydrology and associated wetland plant community in the area. *Benefits*: The primary benefit of this project is to provide and enhance recreational uses through the construction of the proposed amenities. *Health and safety*: The FL TIG does not anticipate impacts to public health and safety based on FDEP experience with construction and use of similar amenities. *Summary*: Based on the OPA evaluation, specifically the likelihood of success and collateral injury, this project was not identified as a preferred alternative by the FL TIG at this time.

REC3, Perdido River and Bay Paddle Trail (preferred)	*Cost-effectiveness*: The estimated cost of $1,165,488 includes planning, design, permitting, construction, monitoring and maintenance activities, oversight, and contingency costs. The costs are based on similar projects, consistent with FDEP's experience, and, in the judgment of the FL TIG, are reasonable and appropriate. *Goals and objectives*: This project is consistent with the Provide and Enhance Recreational Opportunities Restoration Goal and underlying Provide and Enhance Recreational Opportunities Restoration Type and has a clear nexus to the injuries. For example, the Heron Bayou improvements would provide access in an area without public access currently, the parking area would increase access, and the shelters and other amenities would enhance visitors' recreational experiences. *Likelihood of success*: This project includes planning and construction of standard park amenities that are likely to be successfully implemented. These approaches have been successfully implemented by FDEP in the past and have resulted in increased recreational use. This project leverages ongoing DWH-funded efforts including the DWH Early Restoration Phase I Florida Boat Ramp Enhancement and Construction Project (Perdido River Public Boat Ramp). The FL TIG anticipates this project would have a high likelihood of success. *Avoid collateral injury*: This project focuses on increasing and enhancing recreational access through infrastructure improvements. Appropriate BMPs and other measures would be utilized to minimize impacts to other natural resources. *Benefits*: The primary benefit of this project is to provide and enhance recreational uses in Florida through the construction of the proposed amenities. This project has the added benefit of complementing the recreational amenities provided on the Alabama side of the Perdido River, including extending the paddling trail south to Perdido Bay. *Health and safety*: The FL TIG does not anticipate impacts to public health and safety. The entrance drive and parking area would be engineered to minimize changes to traffic flows and consequently only minor traffic impacts are anticipated. The addition of multiple ingress and egress points along the river, for kayakers or others using the river, would improve paddler safety. Further, the amenities would comply with ADA standards. *Summary*: Based on the OPA evaluation, this project was identified as a tentative preferred restoration alternative in this RP/EA.

REC4, Carpenter Creek Headwaters Park Amenities (preferred)	*Cost-effectiveness*: The estimated cost of $446,080 includes planning, design, permitting, construction, monitoring, oversight, and contingency costs. The costs are based on similar projects, consistent with FDEP's experience, and, in the judgment of the FL TIG, are reasonable and appropriate. *Goals and objectives*: This project is consistent with the Provide and Enhance Recreational Opportunities Restoration Goal and underlying Provide and Enhance Recreational Opportunities Restoration Type and has a clear nexus to the injuries. This project would provide new recreational opportunities in an area without public access currently. The parking area and boardwalk would enhance access to the area and the educational signage would enhance awareness of restoration efforts and the importance of the creek and watershed. *Likelihood of success*: This project includes planning and construction of standard park amenities that are likely to be successfully implemented. These approaches have been successfully implemented by FDEP and Escambia County in the past and have resulted in increased recreational use. The FL TIG anticipates this project would have a high likelihood of success. *Avoid collateral injury*: This project focuses on increasing and enhancing recreational access through infrastructure improvements. Appropriate BMPs and other measures would be utilized to minimize impacts to other natural resources. *Benefits*: The primary benefit of this project is to provide and enhance recreational uses through the construction of the proposed amenities. *Health and safety*: The FL TIG does not anticipate impacts to public health and safety. The parking area would be engineered to minimize changes to traffic flows and consequently only minor traffic impacts are anticipated. The amenities would comply with ADA standards. *Summary*: Based on the OPA evaluation, this project was identified as a tentative preferred restoration alternative in this RP/EA.

REC5, Gulf Islands National Seashore (Florida) Rehabilitation of Okaloosa Unit Recreational Facilities (preferred)	*Cost-effectiveness*: The estimated cost of $3,201,383 includes planning, design, permitting, construction, monitoring, oversight, and contingency costs. The costs are based on similar projects, consistent with DOI's experience, and, in the judgment of the FL TIG, are reasonable and appropriate. *Goals and objectives*: This project is consistent with the Provide and Enhance Recreational Opportunities Restoration Goal and underlying Provide and Enhance Recreational Opportunities Restoration Type and has a clear nexus to the injuries. More specifically, the boat ramp, parking area, boardwalk, and RV site enhancements would increase access to recreational opportunities and the boat ramp, picnic areas, lift station, and restrooms would enhance recreational experiences. *Likelihood of success*: This project includes planning and construction of standard park amenities that are likely to be successfully implemented. These approaches have been successfully implemented by DOI in the past and have resulted in increased recreational use. The FL TIG anticipates this project would have a high likelihood of success. *Avoid collateral injury*: This project focuses on increasing and enhancing recreational access through infrastructure improvements. Appropriate BMPs and other measures would be utilized to minimize impacts other natural resources. *Benefits*: The primary benefit of this project is to provide and enhance recreational uses through the construction of the proposed amenities. The project also includes some revegetation efforts which would result in habitat and wildlife benefits. Further, the construction of fencing would help protect sensitive habitats from human foot traffic. *Health and safety*: The FL TIG does not anticipate impacts to public health and safety. The parking area would be engineered to minimize changes to traffic flows and consequently only minor traffic impacts are anticipated. The amenities would comply with ADA standards. *Summary*: Based on the OPA evaluation, this project was identified as a tentative preferred restoration alternative in this RP/EA.

REC6, Joe's Bayou Recreation Area Improvements (preferred)	*Cost-effectiveness*: The estimated cost of $12,202,891 includes planning, design, permitting, construction, monitoring, oversight, and contingency costs. The costs are based on similar projects, consistent with FDEP's experience, and, in the judgment of the FL TIG, are reasonable and appropriate. *Goals and objectives*: This project is consistent with the Provide and Enhance Recreational Opportunities Restoration Goal and underlying Provide and Enhance Recreational Opportunities Restoration Type and has a clear nexus to the injuries. More specifically, the parking areas would increase access and the boat launch, boardwalk, trails, and restrooms would enhance visitor experiences. *Likelihood of success*: This project includes planning and construction of standard park amenities that are likely to be successfully implemented. These approaches have been successfully implemented by FDEP in the past and have resulted in increased recreational use. The FL TIG anticipates this project would have a high likelihood of success. *Avoid collateral injury*: This project focuses on increasing and enhancing recreational access through infrastructure improvements. Appropriate BMPs and other measures would be utilized to minimize impacts other natural resources. *Benefits*: The primary benefit of this project is to provide and enhance recreational uses through the construction of the proposed amenities. *Health and safety*: The FL TIG does not anticipate impacts to public health and safety. In particular, the parking area would be engineered to minimize changes to traffic flows and consequently only minor traffic impacts are anticipated. The parking area would also comply with ADA standards. *Summary*: Based on the OPA evaluation, this project was identified as a tentative preferred restoration alternative in this RP/EA.

REC7, Topsail Hill Preserve State Park Improvements (preferred)	*Cost-effectiveness*: The estimated cost of $3,926,811 includes planning, design, permitting, construction, monitoring, oversight, and contingency costs. The costs are based on similar projects, consistent with FDEP's experience, and, in the judgment of the FL TIG, are reasonable and appropriate. *Goals and objectives*: This project is consistent with the Provide and Enhance Recreational Opportunities Restoration Goal and underlying Provide and Enhance Recreational Opportunities Restoration Type and has a clear nexus to the injuries. More specifically, this project would enhance public access to recreational areas by providing tram and bike-share stations, improving access to the Gulf beach area and Campbell Lake, and improving campground facilities. *Likelihood of success*: This project includes planning and construction of standard park amenities that are likely to be successfully implemented. These approaches have been successfully implemented by FDEP in the past and have resulted in increased recreational use. The FL TIG anticipates this project would have a high likelihood of success. *Avoid collateral injury*: This project focuses on increasing and enhancing recreational access through infrastructure improvements. Appropriate BMPs and other measures would be utilized to minimize impacts other natural resources. *Benefits*: The primary benefit of this project is to provide and enhance recreational uses through the construction of the proposed amenities. The tram and bike-share stations would enhance access and the campground facilities would enhance experiences. In addition, interpretive signage at the entrance and in other areas would increase awareness of the rare coastal dune lake ecosystem. *Health and safety*: The FL TIG does not anticipate impacts to public health and safety. All of the RV campsites and campground facilities would be connected to the central sewer system, enhancing public health. Further, the amenities would comply with ADA standards. *Summary*: Based on the OPA evaluation, this project was identified as a tentative preferred restoration alternative in this RP/EA.

REC8, Camp Helen State Park Improvements (preferred)	*Cost-effectiveness*: The estimated cost of $3,326,027 includes planning, design, permitting, construction, monitoring, oversight, and contingency costs. The costs are based on similar projects, consistent with FDEP's experience, and, in the judgment of the FL TIG, are reasonable and appropriate. *Goals and objectives*: This project is consistent with the Provide and Enhance Recreational Opportunities Restoration Goal and underlying Provide and Enhance Recreational Opportunities Restoration Type and has a clear nexus to the injuries. More specifically, the parking area would enhance public access for recreational opportunities by providing increased access. The docks would provide improved access to the water for recreational use. The day-use area amenities would also enhance the public's recreational opportunities at the park. *Likelihood of success*: This project includes planning and construction of standard park amenities that are likely to be successfully implemented. These approaches have been successfully implemented by FDEP in the past and have resulted in increased recreational use. The FL TIG anticipates this project would have a high likelihood of success. *Avoid collateral injury*: This project focuses on increasing and enhancing recreational access through infrastructure improvements. Appropriate BMPs and other measures would be utilized to minimize impacts to other natural resources. *Benefits*: The primary benefit of this project is to provide and enhance recreational uses through the construction of the proposed amenities. In addition, the walkway extensions would encourage the public to utilize the walkways thereby reducing potential impacts on sensitive habitats such as coastal grassland and dunes. *Health and safety*: The FL TIG does not anticipate impacts to public health and safety. To minimize public health impacts, trash receptacles would be regularly maintained at key access points. Restrooms would be connected to existing municipal lines and maintained regularly. The parking lot would be engineered to minimize changes to traffic flows and consequently only minor traffic impacts are anticipated. The amenities would comply with ADA standards. *Summary*: Based on the OPA evaluation, this project was identified as a tentative preferred restoration alternative in this RP/EA.

REC9, St. Andrews State Park Improvements (preferred)	*Cost-effectiveness*: The estimated cost of $10,875,855 includes planning, design, permitting, construction, monitoring, oversight, and contingency costs. The costs are based on similar projects, consistent with FDEP's experience, and, in the judgment of the FL TIG, are reasonable and appropriate. *Goals and objectives*: This project is consistent with the Provide and Enhance Recreational Opportunities Restoration Goal and underlying Provide and Enhance Recreational Opportunities Restoration Type and has a clear nexus to the injuries. More specifically, the improved entrance area and parking facilities would enhance public access for recreational opportunities, the paddle-craft launch would provide improved access to the water for recreational use, and the pavilions and other amenities would enhance recreational opportunities. *Likelihood of success*: This project includes planning and construction of standard park amenities that are likely to be successfully implemented. These approaches have been successfully implemented by FDEP in the past and have resulted in increased recreational use. The FL TIG anticipates this project would have a high likelihood of success. *Avoid collateral injury*: This project focuses on increasing and enhancing recreational access through infrastructure improvements. Appropriate BMPs and other measures would be utilized to minimize impacts to other natural resources. *Benefits*: The primary benefit of this project is to provide and enhance recreational uses through the construction of the proposed amenities. In addition, the repaving of roadways throughout the park, including the addition of bike lanes and culverts, would also benefit water quality and hydrology. *Health and safety*: The FL TIG does not anticipate impacts to public health and safety. In particular, the reconfigured and expanded parking area and sidewalks connecting amenities would enhance safe access and egress of vehicles and pedestrians. The location of the launch would also be sensitive to paddler safety and intersections with motorized boat traffic. The amenities would comply with ADA standards. *Summary*: Based on the OPA evaluation, this project was identified as a tentative preferred restoration alternative in this RP/EA.

REC10, T.H. Stone Memorial St. Joseph Peninsula State Park Improvements (preferred)	*Cost-effectiveness*: The estimated cost of $977,945 includes permitting, construction, monitoring, oversight, and contingency costs. The costs are based on similar projects, consistent with FDEP's experience, and, in the judgment of the FL TIG, are reasonable and appropriate. *Goals and objectives*: This project is consistent with the Provide and Enhance Recreational Opportunities Restoration Goal and underlying Provide and Enhance Recreational Opportunities Restoration Type and has a clear nexus to the injuries. More specifically, the project would increase and enhance tourism and recreational opportunities at the park and in Gulf County by creating bicycle/pedestrian-use infrastructure. *Likelihood of success*: This project includes planning and construction of standard trail amenities that are likely to be successfully implemented. These approaches have been successfully implemented by FDEP in the past and have resulted in increased recreational use. The FL TIG anticipates this project would have a high likelihood of success. *Avoid collateral injury*: This project focuses on increasing and enhancing recreational access through infrastructure improvements. Appropriate BMPs and other measures would be utilized to minimize impacts to other natural resources. *Benefits*: The primary benefit of this project is to provide and enhance recreational uses through the construction of the proposed amenity. The shared-use path would increase recreational access and use opportunities at the park. *Health and safety*: The FL TIG does not anticipate impacts to public health and safety. The shared-use path would allow for safe and scenic bicycle and pedestrian access within the park, from the park entrance to the Eagle Harbor Day Use Area and primary Gulf Beach Access. The amenity would comply with ADA standards. *Summary*: Based on the OPA evaluation, this project was identified as a tentative preferred restoration alternative in this RP/EA.

REC11, St. Marks National Wildlife Refuge Coastal Trail Connection, Spring Creek to Port Leon (preferred)	*Cost-effectiveness*: The estimated cost of $1,200,000 includes planning, design, permitting, construction, monitoring, oversight, and contingency costs. The costs are based on similar projects, consistent with USDA and DOI's experience, and, in the judgment of the FL TIG, are reasonable and appropriate. *Goals and objectives*: This project is consistent with the Provide and Enhance Recreational Opportunities Restoration Goal and underlying Provide and Enhance Recreational Opportunities Restoration Type and has a clear nexus to the injuries. More specifically, this project would increase access through the extension of the FNST in St. Marks NWR including bridges, puncheon, and boardwalks. *Likelihood of success*: This project includes planning and construction of standard park amenities that are likely to be successfully implemented. These approaches have been successfully implemented by USDA and DOI in the past and have resulted in increased recreational use. The FL TIG anticipates this project would have a high likelihood of success. *Avoid collateral injury*: This project focuses on increasing and enhancing recreational access through infrastructure improvements. Appropriate BMPs and other measures would be utilized to minimize impacts other natural resources. *Benefits*: The primary benefit of this project is to provide and enhance recreational uses through the construction of the proposed amenities. This project would also restore and enhance tourism and recreational opportunities along the FNST by providing improved connectivity, infrastructure, access, and education. *Health and safety*: The FL TIG does not anticipate impacts to public health and safety. The trail improvements, specifically the bridges, would improve safety by providing a safe access across wetlands and other water bodies. The amenities would comply with ADA standards. *Summary*: Based on the OPA evaluation, this project was identified as a tentative preferred restoration alternative in this RP/EA.

3.6 Natural Recovery

Pursuant to the OPA NRDA regulations, the PDARP/PEIS considered a "natural recovery alternative in which no human intervention would be taken to directly restore injured natural resources and services to baseline" (40 CFR 990.53[b][2]). Under this alternative, no additional restoration would be done by the FL TIG to accelerate the recovery of habitat on federally managed lands, water quality, or recreational losses in the Florida Restoration Area using DWH NRDA funding at this time. The FL TIG would allow natural recovery processes to occur, which could result in one of four outcomes for injured resources: (1) gradual recovery, (2) partial recovery, (3) no recovery, or (4) further deterioration. Although injured resources could presumably recover to or near baseline conditions under this scenario, recovery would take much longer compared to a scenario in which restoration actions were undertaken. Given that technically feasible restoration approaches are available to compensate for interim natural resource and service losses, the Trustees rejected this alternative from further OPA evaluation within the PDARP/PEIS. Based on this determination, tiering this RP/EA from the PDARP/PEIS, and incorporating that analysis by reference, the FL TIG did not find natural recovery to be a viable alternative under OPA. Natural recovery is not considered further in this RP/EA.[19]

3.7 Project Costs

The estimated costs for each restoration project evaluated in this RP/EA are provided in Table 2-2 and discussed in the project descriptions in Section 2.5. The total estimated cost for projects proposed under each Restoration Type is as follows:

- Habitat Projects on Federally Managed Lands: $15,196,132 ($2,742,451 for the preferred alternatives);
- Nutrient Reduction: $8,400,000 ($5,250,000 for the preferred alternatives);
- Water Quality: $48,347,069 ($16,945,754 for the preferred alternatives); and
- Provide and Enhance Recreational Opportunities: $40,882,150 ($37,322,480 for the preferred alternatives).

For P&D projects, estimated costs include planning, feasibility studies, design, engineering, and/or other activities needed to facilitate development of a project that could be considered by the FL TIG for implementation in a future restoration plan. For projects proposed for full implementation, estimated costs reflect all costs associated with implementing the project, including but not limited to updating engineering designs, additional P&D activities, construction, monitoring, evaluation, Trustee oversight, management, and/or contingencies. These cost estimates reflect the most current designs and information available to the FL TIG at the time of drafting this RP/EA.

[19] NEPA requires evaluation of a "no action" alternative. This differs from the natural recovery alternative under OPA. The environmental consequences of the NEPA no action alternative is considered separately in Chapter 4.

3.8 OPA Evaluation Conclusions

As described in the sections above, the FL TIG conducted an OPA evaluation of each of the projects included in the reasonable range of alternatives for this RP/EA. All 24 of the preferred restoration alternatives are consistent with the PDARP/PEIS Restoration Goals and Types and the six OPA evaluation criteria as set forth in 990.54(a)(1)-(6). The four preferred P&D alternatives are intended to generate information necessary to design and implement future restoration activities. These projects would not directly restore natural resources or their services, but would provide information needed to effectively do so in the future.

A summary of the OPA evaluation is provided in Table 3-5.

Table 3-5 Summary of OPA evaluation for reasonable range of alternatives

ALTERNATIVES	OPA EVALUATION SUMMARY
Restoration Type:	**Habitat Projects on Federally Managed Lands (FM)**
FM1, Gulf Islands National Seashore (Florida) Beneficial Use of Dredged Materials at Perdido Pass	The project would improve and increase beach habitat. A similar project, utilizing the same sand placement methods, was completed at Perdido Key between 2011 and 2012. However, the timing for this project is not consistent with the USACE's plans for dredging of the pass. Based on the evaluation of the likelihood of success, this project was not identified as a preferred restoration alternative by the FL TIG at this time.
FM2, Gulf Islands National Seashore (Florida) Night Sky Restoration (P&D; preferred)	The estimated project costs are reasonable and appropriate. The project would provide valuable information to the FL TIG on the most effective approach to reduce artificial lighting on GUIS and help with future restoration efforts. As a P&D activity, this project would not cause any collateral injury to resources and would not result in any impacts to public health and safety. As such, this project was identified as a tentative preferred restoration alternative.
FM3, Gulf Islands National Seashore (Florida) Night Sky Restoration (Implementation)	The project is likely to be implemented successfully. However, the FM2, Gulf Islands National Seashore (Florida) Night Sky Restoration (P&D) project should be conducted first to provide the necessary information to increase the cost-effectiveness and likelihood of success to implement Phase II. As such, this project was not identified as a preferred alternative by the FL TIG at this time.
FM4, Gulf Islands National Seashore (Florida) Beach and Dune Habitat Protection (preferred)	The estimated project costs are reasonable and appropriate. The project would protect beach habitat and associated wildlife at GUIS. The project utilizes standard approaches, is likely to be successful, and is not expected to cause collateral injuries. The law enforcement patrols to monitor and control vehicle speeding rates would not only reduce collisions with wildlife but also increase safety for visitors to GUIS. This project was identified as a tentative preferred restoration alternative by the FL TIG.
FM5, Gulf Islands National Seashore (Florida) Invasive Plant Removal (preferred)	The estimated project costs are reasonable and appropriate. The project would protect and enhance habitat within GUIS through invasive species management. The project utilizes standard approaches, is likely to be successful, and is not expected to cause collateral injuries. As such, this project was identified as a tentative preferred restoration alternative by the FL TIG.

ALTERNATIVES	OPA EVALUATION SUMMARY
FM6, St. Vincent National Wildlife Refuge Predator Control (preferred)	The estimated project costs are reasonable and appropriate. The project would protect and conserve habitat through predator control actions to mitigate the negative impacts of feral hogs and raccoons on habitats and resources. The project includes planning and implementation of predator control mechanisms and monitoring of species populations that are highly likely to be successfully implemented. Further, the project is not expected to cause collateral injuries. As such, this project was identified as a tentative preferred restoration alternative by the FL TIG.
Restoration Type:	**Nutrient Reduction (NR)**
NR1, Pensacola Bay and Perdido River Watersheds - Nutrient Reduction (preferred)	The estimated project costs are reasonable and appropriate. The project would improve water quality in the Pensacola Bay and Perdido River watersheds, by reducing sediment and nutrient loads through the implementation of CPs on agricultural lands. The project has a high likelihood of success and the FL TIG does not expect any collateral injury to other natural resources or any impacts to public health and safety. To the extent the project reduces bacterial contaminants in surface waters, there could be a public health benefit. As such, this project was identified as a tentative preferred restoration alternative by the FL TIG.
NR2, Apalachicola Bay Watershed - Nutrient Reduction	The estimated project costs are reasonable and appropriate. The project would improve water quality in the Apalachicola Bay watershed by reducing sediment and nutrient loads through the implementation of CPs on agricultural lands. The project has a high likelihood of success and the FL TIG does not expect any collateral injury to other natural resources or any impacts to public health and safety. To the extent the project reduces bacterial contaminants in surface waters, there could be a public health benefit. However, this watershed has lower agricultural production for agricultural nutrient reduction than the other two proposed alternatives (NR1 and NR3). Therefore, while yielding positive impacts, this project is expected to be less beneficial than these alternatives because it would offer fewer opportunities for implementing nutrient reduction measures. As such, this project was not identified as a preferred alternative by the FL TIG at this time.
NR3, Lower Suwannee River Watershed - Nutrient Reduction (preferred)	The estimated project costs are reasonable and appropriate. The project would improve water quality in the Lower Suwannee River watershed by reducing sediment and nutrient loads through the implementation of CPs on agricultural lands. The project has a high likelihood of success and the FL TIG does not expect any collateral injury to other natural resources or any impacts to public health and safety. To the extent the project reduces bacterial contaminants in surface waters, there could be a public health benefit. As such, this project was identified as a tentative preferred restoration alternative by the FL TIG.
Restoration Type:	**Water Quality (WQ)**
WQ1, Carpenter Creek Headwaters Water Quality Improvements (preferred)	The estimated project costs are reasonable and appropriate. The project would reduce pollution and hydrologic degradation to coastal wetlands by restoring wetlands and constructing a stormwater pond that would reduce erosion as well as sediments, nutrients, and other pollutions associated with stormwater runoff. The project has a high likelihood of success and the FL TIG does not expect any collateral injury to other natural resources or any impacts to public health and safety. As such, this project was identified as a tentative preferred restoration alternative by the FL TIG.
WQ2, Pensacola Beach Reclaimed Water System Expansion (preferred)	The estimated project costs are reasonable and appropriate. The project would improve water quality through reduced nutrient loading to Santa Rosa Sound. The project has a high likelihood of success and the FL TIG does not expect any collateral injury to other natural resources or any impacts to public health and safety. As such, this project was identified as a tentative preferred restoration alternative by the FL TIG.

ALTERNATIVES	OPA EVALUATION SUMMARY
WQ3, Rattlesnake Bluff Road and Riverbank Restoration (preferred)	The estimated project costs are reasonable and appropriate. The project would improve water quality by mitigating the impacts of excessive sedimentation to the Yellow River and Pensacola Bay. The project has a high likelihood of success and the FL TIG does not expect any collateral injury to other natural resources or any impacts to public health and safety. As such, this project was identified as a tentative preferred restoration alternative by the FL TIG.
WQ4, Pensacola Bay Unpaved Roads Initiative (P&D; preferred)	The estimated project costs are reasonable and appropriate. The project would reduce erosion and transport of sediment downstream and improve water quality in Pensacola Bay, a watershed impacted by the DWH oil spill. The project has a high likelihood of success and, as a P&D activity, the FL TIG does not expect any collateral injury to other natural resources or any impacts to public health and safety. As such, this project was identified as a tentative preferred restoration alternative by the FL TIG.
WQ5, Alligator Lake Coastal Dune Lake Hydrologic Restoration (preferred)	The estimated project costs are reasonable and appropriate. The project would restore hydrologic connections between the estuarine and freshwater portions of Alligator Lake and enhance coastal habitats injured by the DWH oil spill. The project has a high likelihood of success and the FL TIG does not expect any collateral injury to other natural resources or any impacts to public health and safety. As such, this project was identified as a tentative preferred restoration alternative by the FL TIG.
WQ6, Grand Lagoon Regional Stormwater Facility	The estimated project costs are reasonable and appropriate. The project would improve water quality in watersheds injured by the DWH oil spill by reducing point and nonpoint source pollution from reaching Grand Lagoon, which is part of the St. Andrew Bay sector and direct connection to the Gulf of Mexico. This project includes developing a stormwater treatment facility, using approaches that have been successfully implemented by FDEP in other similar projects across Florida. However, land would need to be acquired from willing sellers, with sufficient acreage and in the right location, to allow construction of the stormwater treatment facilities. It is unknown at this time whether such land could be acquired. As such, this project was not identified as a preferred alternative by the FL TIG at this time.
WQ7, St. Andrew Bay Unpaved Roads Initiative (P&D)	The estimated project costs are reasonable and appropriate. The project would reduce erosion and transport of sediment downstream and improve water quality in a watershed impacted by the DWH oil spill through mitigating the adverse effects of unpaved roads. Based on the results of an inventory conducted to identify unpaved roads in 16 northwest Florida counties, Pensacola Bay was identified as the watershed with the second largest number of unpaved, county-maintained roads, after Choctawhatchee Bay. A similar study for Choctawhatchee Bay is currently being funded with NFWF GEBF funds. Therefore, the FL TIG believes Pensacola Bay is a higher priority watershed compared to St. Andrew Bay for this type of restoration activity. Therefore, while addressing unpaved roads in St. Andrew Bay Watershed would yield positive impacts, this project is expected to be less beneficial than the restoration alternative proposed for Pensacola Bay Watershed (see WQ4). As such, this project was not identified as a preferred alternative by the FL TIG at this time.
WQ8, City of Port St. Joe Stormwater Improvements (preferred)	The estimated project costs are reasonable and appropriate. The project would improve water quality in watersheds injured by the DWH oil spill by capturing and treating stormwater runoff prior to discharge into St. Joseph Bay. The project has a high likelihood of success and the FL TIG does not expect any collateral injury to other natural resources or any impacts to public health and safety. As such, this project was identified as a tentative preferred restoration alternative by the FL TIG.

ALTERNATIVES	OPA EVALUATION SUMMARY
WQ9, MK Ranch Hydrologic Restoration	The estimated project costs are reasonable and appropriate. The project would improve water quality in watersheds injured by the DWH oil spill and restore historic wetland structure and function by reconnecting the natural drainage pathways within the watershed. The FL TIG does not expect any collateral injury to other natural resources or any impacts to public health and safety. The success of this project, as it relates to implementation of full restoration of the MK Ranch site, is contingent upon acquisition of the Lake Wimico parcel west of ARWEA. As such, this project was not identified as a preferred alternative by the FL TIG at this time.
WQ10, City of Carrabelle's Lighthouse Estates: Septic Tank Abatement - Phase II (preferred)	The estimated project costs are reasonable and appropriate. The project would improve water quality in watersheds injured by the DWH oil spill by reducing the discharge pollutant loading that otherwise would impact the health and quality of estuarine habitats in receiving waters. In addition to water quality benefits, this project would also have recreational use benefits (e.g., helping to reduce the potential for beach closures). The project has a high likelihood of success and the FL TIG does not expect any collateral injury to other natural resources or any impacts to public health and safety. As such, this project was identified as a tentative preferred restoration alternative by the FL TIG.
WQ11, Lower Suwannee National Wildlife Refuge Hydrologic Restoration (P&D; preferred)	The estimated project costs are reasonable and appropriate. The project would provide a restoration strategy to help improve hydrologic conditions in the Lower Suwannee NWR area through the compilation and analysis of existing water quality and flow data and hydrologic modeling assessments. The project has a high likelihood of success; DOI and NWR staff have conducted similar modeling and analysis exercises in the past. As a P&D activity, the FL TIG does not expect any collateral injury to other natural resources or any impacts to public health and safety. As such, this project was identified as a tentative preferred restoration alternative by the FL TIG.
WQ12, Lower Charlotte Harbor Flatwoods Hydrologic Restoration Initiative, Yucca Pens Unit (P&D; preferred)	The estimated project costs are reasonable and appropriate. If implemented, the project would develop a science-based, data-driven, Strategic Hydrological Planning Tool that would provide guidance to resource management agencies for restoration and management of surface waters flowing from the Cecil Webb/Babcock and Yucca Pens Unit WMAs through tidal creeks and discharging into eastern Charlotte Harbor and the Caloosahatchee River. The project has a high likelihood of success and, as a P&D project, the FL TIG does not expect any collateral injury to other natural resources or any impacts to public health and safety. As such, this project was identified as a tentative preferred restoration alternative by the FL TIG.
Restoration Type:	**Provide and Enhance Recreational Opportunities (REC)**
REC1, Perdido Bay Sunset Islands Snorkeling Trail	This project includes planning and construction of a breakwater and snorkeling trail. While FDEP and Escambia County have experience in constructing breakwaters, neither has experience in the establishment of an underwater snorkeling trail. This project could result in potential health and safety concerns related to the snorkeling trail which is proposed to be located near a high-boat traffic area (Intracoastal Waterway). As such, this project was not identified as a preferred alternative by the FL TIG at this time.
REC2, Tarkiln Bayou Preserve State Park Improvements	This project focuses on providing and enhancing recreational opportunities through infrastructure improvements. However, these improvements could impact the wetland plant community in the area. This project includes planning and construction of standard park amenities that are likely to be successfully implemented. However, it would be difficult to improve the access road from the entrance area to the beach-use area due to hydrologic issues (i.e., sheet water flows) even with the proposed enhancements (e.g., low water crossings). Additionally, there are logistical issues with transporting paddle-craft from the parking area to the end of the boardwalk to access the proposed launch. As such, this project was not identified as a preferred alternative by the FL TIG at this time.

ALTERNATIVES	OPA EVALUATION SUMMARY
REC3, Perdido River and Bay Paddle Trail (preferred)	The estimated project costs are reasonable and appropriate. The Heron Bayou improvements would provide access in an area with no public access currently, the parking area would increase access, and the shelters and other amenities would enhance visitors' recreational experiences. The project has a high likelihood of success and the FL TIG does not expect any collateral injury to other natural resources. The addition of multiple ingress and egress points along the river, for kayakers or others using the river, would improve paddler safety. As such, this project was identified as a tentative preferred restoration alternative by the FL TIG.
REC4, Carpenter Creek Headwaters Park Amenities (preferred)	The estimated project costs are reasonable and appropriate. The project would provide new recreational opportunities in an area with no current public access. The parking area and boardwalk would enhance access to the area and the educational signage would enhance awareness of restoration efforts and the importance of the creek and watershed. The project has a high likelihood of success and the FL TIG does not expect any collateral injury to other natural resources or public health and safety. As such, this project was identified as a tentative preferred restoration alternative by the FL TIG.
REC5, Gulf Islands National Seashore (Florida) Rehabilitation of Okaloosa Unit Recreational Facilities (preferred)	The estimated project costs are reasonable and appropriate. The project would provide new recreational opportunities; the boat ramp, parking area, boardwalk, and RV site enhancements would increase access to recreational opportunities; the boat ramp, picnic areas, lift station, and restrooms would enhance recreational experiences. The project has a high likelihood of success and the FL TIG does not expect any collateral injury to other natural resources or public health and safety. As such, this project was identified as a tentative preferred restoration alternative by the FL TIG.
REC6, Joe's Bayou Recreation Area Improvements (preferred)	The estimated project costs are reasonable and appropriate. The project would provide new recreational opportunities; the parking areas would increase access and the boat launch, boardwalk, trails, and restrooms would enhance experiences. The project has a high likelihood of success and the FL TIG does not expect any collateral injury to other natural resources or public health and safety. As such, this project was identified as a tentative preferred restoration alternative by the FL TIG.
REC7, Topsail Hill Preserve State Park Improvements (preferred)	The estimated project costs are reasonable and appropriate. This project would enhance public access to recreational areas by providing tram and bike-share stations; improving access to the beach area and Campbell Lake; and by improving campground facilities. The project has a high likelihood of success and the FL TIG does not expect any collateral injury to other natural resources or public health and safety. As such, this project was identified as a tentative preferred restoration alternative by the FL TIG.
REC8, Camp Helen State Park Improvements (preferred)	The estimated project costs are reasonable and appropriate. The project would enhance public recreational opportunities; the parking area would enhance public access to natural resources for recreational opportunities by providing improved public access to an area with limited access. The docks would provide improved access to the water for recreational use. The day-use area amenities would also enhance the public's recreational opportunities at the park. The project has a high likelihood of success and the FL TIG does not expect any collateral injury to other natural resources or public health and safety. As such, this project was identified as a tentative preferred restoration alternative by the FL TIG.

ALTERNATIVES	OPA EVALUATION SUMMARY
REC9, St. Andrews State Park Improvements (preferred)	The estimated project costs are reasonable and appropriate. The project would provide and enhance recreational opportunities; the improved entrance area and parking facilities would enhance public access to natural resources for recreational opportunities; the paddle-craft launch would provide improved access to the water for recreational use; and the pavilions and other amenities would enhance recreational opportunities. In addition to recreational benefits, the repaving of roadways throughout the park, including the addition of bike lanes and culverts, would benefit water quality and hydrology. The project has a high likelihood of success and the FL TIG does not expect any collateral injury to other natural resources or public health and safety. As such, this project was identified as a tentative preferred restoration alternative by the FL TIG.
REC10, T.H. Stone Memorial St. Joseph Peninsula State Park Improvements (preferred)	The estimated project costs are reasonable and appropriate. The project would increase and enhance tourism and recreational opportunities at the park and in Gulf County by creating bicycle/pedestrian-use infrastructure. The project has a high likelihood of success and the FL TIG does not expect any collateral injury to other natural resources or public health and safety. The shared-use path would allow for safe and scenic bicycle and pedestrian access within the park, from the park entrance to the Eagle Harbor Day Use Area and primary Gulf Beach Access. As such, this project was identified as a tentative preferred restoration alternative by the FL TIG.
REC11, St. Marks National Wildlife Refuge Coastal Trail Connection, Spring Creek to Port Leon (preferred)	The estimated project costs are reasonable and appropriate. The project would increase access through the extension of the FNST in St. Marks NWR including bridges, puncheon, and boardwalks. The project has a high likelihood of success and the FL TIG does not expect any collateral injury to other natural resources or public health and safety. The trail improvements, and specifically the bridges, would improve safety by providing a safe access across wetlands and other water bodies. As such, this project was identified as a tentative preferred restoration alternative by the FL TIG.

Based on the OPA evaluations summarized above and information and analyses presented in this RP/EA, the FL TIG proposes to proceed with the 24 preferred alternatives (identified as 'Preferred' in Table 2-2). At this time, the FL TIG does not intend to proceed further with the remaining eight alternatives. Projects not identified as preferred in this RP/EA or not selected for implementation in the Final RP/EA can be considered for evaluation in future restoration plans.

Chapter 4 Environmental Assessment

4.1 Overview of NEPA Approach

This chapter describes the anticipated environmental impacts of the proposed action (implementation of the preferred alternatives) and the alternatives not preferred for implementation at this time. The NEPA analysis presented in this chapter is consistent with the PDARP/PEIS and tiers where applicable. Resources analyzed and impacts definitions (minor, moderate, major) align with the PDARP/PEIS (Appendix C).[1] The PDARP/PEIS is incorporated by reference.

To determine whether an action has the potential to result in significant impacts, the context and intensity of the action must be considered. Context refers to area of impacts (local, state-wide, etc.) and duration (e.g., whether they are short- or long-term impacts). Intensity refers to the severity of impact and could include the timing of the action (e.g., more intense impacts would occur during critical periods like high visitation or wildlife breeding/rearing, etc.). Intensity is also described in terms of whether the impact would be beneficial or adverse.

Incorporation by reference of relevant information from existing NEPA analyses, studies, or other material is used in this analysis to streamline the NEPA process and to present a concise document that briefly provides sufficient evidence and analysis for determining whether to prepare an environmental impact statement or finding of no significant impact, and to aid the FL TIG's compliance with NEPA (40 CFR § 1506.3, 40 CFR § 1508.9). Agencies should "focus on significant environmental issues" and for other than significant issues there should be "only enough discussion to show why more study is not warranted" (40 CFR §§ 1502.1 and 1502.2). All source documents relied upon for the NEPA analyses are available to the public and links are provided in the discussion of the environmental consequences where applicable.

This chapter organizes the projects by watershed(s). By organizing the projects in this manner, the impacts of this RP/EA can be better evaluated at a broader scale. Table 4-1 describes the watersheds addressed in this RP/EA, the project tracking number and title, and the section of Chapter 4 in which the evaluation is located.

[1] Physical Resources: Geology and Substrates, Hydrology and Water Quality, Air Quality, Noise; Biological Resources: Habitats, Wildlife Species (Including Birds), Marine and Estuarine Fauna (Fish, Shellfish, Benthic Organisms), Protected Species; Socioeconomic Resources: Socioeconomics and Environmental Justice, Cultural Resources, Infrastructure, Land and Marine Management, Tourism and Recreational Use, Fisheries and Aquaculture, Marine Transportation, Aesthetics and Visual Resources, Public Health and Safety, including Flood and Shoreline Protection.

Table 4-1 Reasonable Range of Alternatives in this RP/EA by Watershed

Watershed	Tracking Number[1]	Project	Chapter 4 section
Coastal barrier islands	FM1	Gulf Islands National Seashore (Florida) Beneficial Use of Dredged Materials at Perdido Pass	4.4.1.2
	FM2	Gulf Islands National Seashore (Florida) Night Sky Restoration (P&D)[2]	4.3.1
	FM3	Gulf Islands National Seashore (Florida) Night Sky Restoration (Implementation)	4.4.1.3
	FM4	Gulf Islands National Seashore (Florida) Beach and Dune Habitat Protection[2]	4.4.1.4
	FM5	Gulf Islands National Seashore (Florida) Invasive Plant Removal[2]	4.4.1.5
	REC5	Gulf Islands National Seashore (Florida) Rehabilitation of Okaloosa Unit Recreational Facilities[2]	4.4.1.6
	FM6	St. Vincent National Wildlife Refuge Predator Control[2]	4.4.2
	WQ2	Pensacola Beach Reclaimed Water System Expansion[2,3]	4.4.3
Perdido River and Bay	REC1	Perdido Bay Sunset Islands Snorkeling Trail	4.5.2
	REC2	Tarkiln Bayou Preserve State Park Improvements	4.5.3
	REC3	Perdido River and Bay Paddle Trail[2]	4.5.4
Pensacola Bay	WQ4	Pensacola Bay Unpaved Roads Initiative (P&D)	4.3.2
	WQ1	Carpenter Creek Headwaters Water Quality Improvements[2]	4.6.2
	REC4	Carpenter Creek Headwaters Park Amenities[2]	4.6.3
	WQ3	Rattlesnake Bluff Road and Riverbank Restoration[2]	4.6.4
	NR1	Pensacola Bay and Perdido River Watersheds - Nutrient Reduction[2]	4.6.5
Choctawhatchee River and Bay	REC6	Joe's Bayou Recreation Area Improvements[2]	4.7.2
	REC7	Topsail Hill Preserve State Park Improvements[2]	4.7.3
	WQ5	Alligator Lake Coastal Dune Lake Hydrologic Restoration Project[2]	4.7.4
St. Andrew Bay	REC8	Camp Helen State Park Improvements[2]	4.8.2
	REC9	St. Andrews State Park Improvements[2]	4.8.3
	WQ6	Grand Lagoon Regional Stormwater Facility	4.8.4
	WQ7	St. Andrew Bay Unpaved Roads Initiative (P&D)	4.3.3
	WQ8	City of Port St. Joe Stormwater Improvements[2]	4.8.5
Apalachicola River and Bay	REC10	T.H. Stone Memorial St. Joseph Peninsula State Park Improvements[2]	4.9.2
	NR2	Apalachicola Bay Watershed - Nutrient Reduction	4.9.3
	WQ9	MK Ranch Hydrologic Restoration	4.9.4
	WQ10	City of Carrabelle's Lighthouse Estates: Septic Tank Abatement - Phase II[2]	4.9.5
St. Marks River and Apalachee Bay	REC11	St. Marks National Wildlife Refuge Coastal Trail Connection, Spring Creek to Port Leon[2]	4.10.1
Suwannee River	NR3	Lower Suwannee River Watershed - Nutrient Reduction[2]	4.11.1

Watershed	Tracking Number[1]	Project	Chapter 4 section
	WQ11	Lower Suwannee National Wildlife Refuge Hydrologic Restoration (P&D)[2]	4.3.4
Charlotte Harbor	WQ12	Lower Charlotte Harbor Flatwoods Hydrologic Restoration Initiative, Yucca Pens Unit (P&D)[2]	4.3.5

Notes:
[1] FM = Habitat Projects on Federally Managed Lands; NR = Nutrient Reduction; WQ = Water Quality; REC = Provide and Enhance Recreational Opportunities.
[2] Preferred projects.
[3] This project is analyzed under the Coastal Barrier Islands watershed, but also falls in Pensacola Bay watershed.

4.2 Resources Not Analyzed in Detail in this RP/EA

To avoid redundant or unnecessary information, projects addressed in this RP/EA were reviewed to determine whether some resources either would not be affected or would have minimal, short-term impacts that are common to all alternatives. Impacts of alternatives to these resources (not affected or minimally affected) are addressed below, along with the rationale for grouping the analysis of impacts to the resources in this section.

4.2.1 Physical Resources

4.2.1.1 Air Quality and Greenhouse Gas Emissions

EPA defines ambient air in 40 C.F.R. Part 50 as "that portion of the atmosphere, external to buildings, to which the general public has access." In compliance with the 1970 Clean Air Act (CAA) and the 1977 and 1990 Clean Air Act Amendments (CAAA), EPA has promulgated National Ambient Air Quality Standards (NAAQS). The NAAQS include primary standards which set limits to protect public health, including the health of "sensitive" populations such as asthmatics, children, and the elderly. To date, EPA has issued NAAQS for seven criteria pollutants: carbon monoxide (CO), sulfur dioxide (SO_2), particles with a diameter less than or equal to a nominal 10 microns (PM10), particles with a diameter less than or equal to a nominal 2.5 microns (PM2.5), ozone (O_3), nitrogen dioxide (NO_2), and lead (Pb). Individual states may promulgate their own ambient air quality standards for these "criteria" pollutants, provided that they are at least as stringent as the federal standards. None of the projects are located in a county currently listed on EPA's nonattainment counties for any criteria pollutant (EPA 2018).

Greenhouse gases (GHGs) are chemical compounds found in the Earth's atmosphere that absorb and trap infrared radiation as heat. The principal GHGs emitted into the atmosphere through human activities are carbon dioxide, methane, nitrous oxide, and fluorinated gases, which are described in more detail below (EPA 2018b).

- Carbon dioxide enters the atmosphere through burning fossil fuels (coal, natural gas, and oil) solid waste, trees and wood products, and also as a result of certain chemical reactions (e.g., manufacture of cement). Carbon dioxide is removed from the atmosphere (or "sequestered") when it is absorbed by plants as part of the biological carbon cycle.
- Methane is emitted during the production and transport of coal, natural gas, and oil. Methane emissions also result from livestock and other agricultural practices and by the decay of organic waste in municipal solid waste landfills.

- Nitrous oxide is emitted during agricultural and industrial activities, as well as during combustion of fossil fuels and solid waste. Hydrofluorocarbons, perfluorocarbons, sulfur hexafluoride, and nitrogen trifluoride are synthetic, powerful GHGs that are emitted from a variety of industrial processes.
- Fluorinated gases are sometimes used as substitutes for stratospheric ozone-depleting substances (e.g., chlorofluorocarbons, hydrochlorofluorocarbons, and halons).

The PDARP/PEIS (Chapter 6) found that short-term, minor to moderate impacts to air quality may occur during construction associated with projects falling under the restoration categories of Provide and Enhance Recreational Opportunities, Habitat Projects on Federally Managed Lands, and Water Quality. Past project-specific NEPA evaluations of DWH restoration projects in Florida similar to those proposed in this RP/EA found that project impacts would be consistent with the PDARP/PEIS findings. For example, a detailed evaluation in the DWH Oil Spill: Programmatic and Phase III Early Restoration Plan and Early Restoration Programmatic Environmental Impact Statement (Phase III RP/PEIS) for a project that would provide recreational access improvements to Bald Point State Park, including constructing a restroom, boardwalks, and installation of a canoe/kayak launch found that impacts to air quality would be expected to be localized and occur only during active construction activities. Engine exhaust from construction equipment and other vehicles would contribute to an increase in criteria pollutants, GHGs, and other air pollutants. However, because of the small scale and short duration of the construction portion of the projects, predicted emissions would be minor and short-term, and would not require a detailed assessment. In another example, a large project at Norriego Point in Destin Harbor that included construction of several erosion control structures to dissipate wave energy and protect dredged fill that would be placed landward of the revetment to restore and expand the land area lost over time found that air quality impacts that would occur would be localized, short in duration, and minor based on the small scale of construction (see the Phase III ERP/PEIS http://www.gulfspillrestoration.noaa.gov/sites/default/files/wp-content/uploads/ERP-PEIS-Part-5-Chapter-12D-E.pdf). Over the long-term, it was anticipated that some sites would experience an increase in use by the public, potentially resulting in increased emissions and impacts to air quality from passenger vehicles; however, the increase in visitor use was not expected to be substantial enough to cause any evident impacts to air quality.

Projects in this RP/EA are anticipated to be similar to projects evaluated in the Phase III ERP/PEIS. As such, air quality impacts would be expected to be localized and occur primarily during active construction activities from emissions generated by construction equipment and vehicles. Engine exhaust from construction equipment and other vehicles would contribute to an increase in criteria air pollutants,[2] GHGs, and other air pollutants. Because of the small scale and short duration of the

[2] The Clean Air Act requires EPA to set National Ambient Air Quality Standards (NAAQS) for six common air pollutants (also known as "criteria air pollutants"). These pollutants (carbon monoxide, lead, ground-level ozone, particulate matter, nitrogen dioxide, and sulfur dioxide**)** are found all over the U.S. They can harm your health and the environment, and cause property damage. Sections 108 and 109 of the Clean Air Act (CAA) govern the establishment, review, and revision, as appropriate, of the National Ambient Air Quality Standards (NAAQS) for each criteria air pollutant to provide protection for the nation's public health and the environment. (https://www.epa.gov/criteria-air-pollutants#self)

construction portion of the applicable alternatives, and the low level of increased vehicle traffic anticipated to be generated by the projects, anticipated project emissions are expected to be minor and short-term, with only minor adverse long-term effects associated with increased emissions from new visitor vehicles for some of the recreation projects. These activities are not expected to cause an exceedance of the NAAQS, even when considered cumulatively with other area emissions. Because the short-term and long-term impacts across project types included in this RP/EA would most likely result in negligible to minor long-term adverse impacts, this resource area was not carried forward for detailed analysis.

4.2.1.2 Noise

The PDARP/PEIS (Chapter 6) states the primary sources of terrestrial noise in the coastal environment are transportation and construction-related activities, which is consistent with areas affected by this RP/EA. The primary sources of ambient (background) noise in the project areas for this RP/EA are operation of vehicles, humans, recreational boating vessels, and natural sounds such as wind and wildlife. The level of noise in the project areas vary depending on the season, time of day, number and types of noise sources, and distance from the noise source.

The PDARP/PEIS (Chapter 6) found that impacts to noise associated with most restoration approaches relevant to this RP/EA would be minor to moderate in the short-term, with minor long-term impacts associated with increased visitation and vehicle use. The PDARP noted that restoring and enhancing dunes and beaches and creating, restoring, and enhancing barrier and coastal islands and headlands would increase local noise levels temporarily, and minor to major adverse impacts from noise may occur during construction. The severity of these physical impacts was anticipated to depend to a large degree on the location of the project, the amount of disturbance that these activities would generate, and the distance to sensitive receptors such as recreational users or wildlife.

Past project-specific NEPA evaluations of DWH restoration projects in Florida similar to those proposed in this RP/EA found that project impacts would be consistent with the PDARP/PEIS findings. For example, the NEPA evaluation of the ARWEA Cash Bayou project, which would construct a parking lot, information kiosk, and wildlife observation structure, found that the project would generate construction noise associated with equipment during the construction period. Because construction noise would be temporary, adverse impacts to the human environment during construction activities were expected to be short-term and minor. After construction, minor long-term effects associated with noise associated with operations, vehicles associated with site use, and visitor use of the site were anticipated. Overall impacts to noise were anticipated to be long-term, minor and adverse.

Consistent with the PDARP/PEIS and past evaluations of restoration planning projects in Florida, projects in this RP/EA under the Provide and Enhance Recreational Opportunities, Habitat Projects on Federally Managed Lands, Nutrient Reduction, and Water Quality Restoration Types would result in minor to moderate, temporary noise from construction equipment. Activities that result in increased noise from proposed alternatives would primarily be short-term, associated with construction activities, and would be timed to have minimal effects on wildlife. Construction noise would conclude once the construction is completed. Minor long-term noise impacts are anticipated associated with some recreation and

habitat projects on federal lands, where impacts of the projects may include increased visitation to particular sites. Long-term adverse impacts to the noise environment are not anticipated associated with nutrient reduction or water quality projects. As such, this resource area was not carried forward for detailed analysis. An estimate of the impacts to noise for each resource is presented in Table 4-40.

4.2.2 Socioeconomic Resources

4.2.2.1 Environmental Justice

The intent of an environmental justice evaluation under Executive Order 12898, "Federal Actions to Address Environmental Justice in Minority and Low Income Populations" (1994), is to identify communities and groups that meet environmental justice criteria and suggest strategies to reduce potential adverse impacts of projects on affected groups. The purpose of Executive Order 12898 is to identify and address the disproportionate placement of adverse environmental, economic, social, or health impacts from federal actions and policies on minority and/or low-income communities. This order requires lead agencies to evaluate impacts on minority or low-income populations during preparation of environmental and socioeconomic analyses of projects or programs that are proposed, funded, or licensed by federal agencies.

Appendix D presents general demographic data for the counties in which projects are planned. The projects in this RP/EA are anticipated to benefit natural resources or access to recreational uses of those natural resources over the long-term. Implementation of the projects, particularly those including construction activities, is anticipated to result in short-term increases in the demand for employment. While some short-term closures to localized areas could occur during project construction, none of these are anticipated in minority or low-income populations. None of the alternatives evaluated in this RP/EA would create a disproportionately high and adverse effect on minority or low-income populations (see Appendix D for details on this analysis). Two projects aim to provide benefits to water quality and recreational access to urbanized areas that may be underserved (REC4/WQ1, Carpenter Creek Improvements and WQ10, City of Carrabelle's Lighthouse Estates Septic Tank Abatement). Therefore, this resource area was not carried forward for detailed analysis.

4.2.2.2 Cultural Resources

Cultural resources are evidence of past human activity. These may include pioneer homes, buildings, or old roads; structures with unique architecture; prehistoric village sites; historic or prehistoric artifacts or objects; rock inscription; human burial sites; or earthworks, such as battlefield entrenchments, prehistoric canals, or mounds. These nonrenewable resources often yield unique information about past societies and environments and provide answers for modern-day social and conservation problems. Although many have been discovered and protected, numerous forgotten, undiscovered, or unprotected cultural resources exist in rural America (USDA-NRCS, n.d.). Although neither NEPA nor any other federal law defines "cultural resource," several laws and executive orders deal with resources that are cultural in character.

As stated in the PDARP/PEIS, all projects implemented under subsequent restoration plans and tiered NEPA analyses consistent with the PDARP/PEIS would secure all necessary state and federal permits, authorizations, consultations, or other regulatory processes, and ensure the project is in accordance

with all applicable laws and regulations concerning the protection of cultural and historic resources. For some projects included in this RP/EA, the action would involve a study or program that would not have the potential to disturb cultural resources. For those projects that include construction, ground disturbance, or other related activities, if any culturally or historically important resources were identified during project preparations or predevelopment surveys, such areas would be avoided during construction. A complete review of all alternatives under Section 106 of the NHPA is ongoing and would be completed prior to any activities that would restrict consideration of measures to avoid, minimize, or mitigate any adverse effects on historic properties located in the project area. Alternatives would be implemented in accordance with all applicable laws and regulations concerning the protection of cultural and historic resources.

Several project action areas include known or potential cultural resources. Coordination with the State Historic Preservation Office (SHPO) regarding the extent and nature of cultural resources at all of the locations under consideration in this RP/EA is ongoing, including with interested Tribes. Updated information with regard to compliance with Section 106 will be provided in the final RP/EA. The section below briefly highlights known sensitive cultural resources located on or near projects in this RP/EA:

- **Projects at GUIS (FM1, FM2, FM3, FM4, FM5, REC5).** Cultural and historical features are major visitor attractions to some areas where proposed restoration projects are planned, primarily at GUIS. Numerous terrestrial cultural resource surveys have been conducted in GUIS by NPS personnel and other public and private institutions. These surveys have identified archeological sites throughout GUIS that are associated with both the historic and prehistoric periods. Prehistoric sites are generally midden sites containing a variety of ceramic and lithic materials. Historic sites have been identified in the GUIS as well. The four national register-listed historic structures in GUIS are Fort Barrancas Historic District, Fort Pickens, Fort Massachusetts, and Perdido Key Historic District. Archeological remains are primarily midden sites with identified materials ranging from glass and ceramic to metal, and in some cases the remains of wood used in construction, fires, and tools. More information about cultural resources can be found in the "Cultural Resource Topics Considered and Analyzed in Detail" section of the GUIS Final General Management Plan/Environmental Impact Statement (GUIS GMP; NPS 2014).
    - **FM1, Gulf Islands National Seashore (Florida) Beneficial Use of Dredged Materials at Perdido Pass.** Proposed activities would not impact cultural resources (USACE 2010). This is conditional that a 1,000-foot radius protective buffer zone would be established during disposal activities around the two cultural resource targets identified in the adjacent nearshore area involving a historic recorded shipwreck (Concrete Ballast Wreck 8ES2995) and an unrecorded historic barge wreck (USACE 2010).
    - **FM3, Gulf Islands National Seashore (Florida) Night Sky Restoration (Implementation).** Lighting retrofits would be conducted only after a Section 106 review process is completed and coordination with the Florida SHPO has occurred. As a result, project activities are not anticipated to have negative effects on cultural and historic resources.
- **WQ10, City of Carrabelle's Lighthouse Estates: Septic Tank Abatement - Phase II.** A previous cultural resources survey was conducted in the vicinity of the Carrabelle lighthouse and, based on background research and a review of the Florida Master Site File (FMSF), no archaeological

sites are located in the project vicinity (Almy and Horvath 2008). The historic archaeological component of the lighthouse was recorded as 8FR991. No evidence of aboriginal occupation of the tract was encountered. No archaeological sites or historic structures, which are listed, determined eligible, or considered potentially eligible for listing in the National Register of Historic Places (NRHP), are expected to be affected by the proposed facility improvements.

- **WQ3, Rattlesnake Bluff Road and Riverbank Restoration**. A NHPA Section 106 Consultation between the Eglin Cultural Resource Section, the Fort Benning Cultural Resource Section, Florida SHPO, and Tribal officials was completed for the project area and surrounding area. Six archaeological sites have been evaluated as eligible for nomination to the NRHP and, therefore, raise cultural concerns. The Cox Cemetery also presents a cultural concern. Ordinarily cemeteries or graves are not considered eligible for the NRHP, but Florida state law (Chapter 872.02) makes it illegal to willfully and knowingly disturb human remains or even memorials (e.g., fences, tombstones, markers, vegetation) associated with a burial. The direct impact posed by adverse effect to five historic properties would be mitigated by avoidance and monitoring within the proposed ROW. Indirect impacts to all six historic properties would be mitigated through avoidance and professional monitoring within the area of cultural concern. Due to the implementation of these measures, no adverse effect on historic properties is expected. An agreement with SHPO outlines measures to avoid, mitigate, and to support data recovery where necessary.
- Initial cultural resource surveys are being conducted for the following projects:
    - REC3, Perdido River and Bay Paddle Trail
    - WQ1, Carpenter Creek Headwaters Park Amenities
    - REC6, Joe's Bayou Recreation Area Improvements
    - REC7, Topsail Hill Preserve State Park Improvements
    - REC8, Camp Helen State Park Improvements
    - REC9, St. Andrews State Park Improvements
    - REC10, T.H. Stone Memorial St. Joseph Peninsula State Park Improvements
    - REC11, St. Marks National Wildlife Refuge Coastal Trail Connection, Spring Creek to Port Leon
    - WQ8, City of Port St. Joe Stormwater Improvements.

The consultation status will be provided in the Final RP/EA.

4.2.2.3 Fisheries and Aquaculture

No commercial fisheries or aquaculture operations in project areas would be adversely affected by the projects proposed under the Restoration Types included in this RP/EA. Short-term adverse impacts would be none to minor. In the short-term, water quality may decrease due to implementation of some projects, but these changes would be short-term and minor. Water quality and nutrient reduction projects may result in long-term benefits to fish populations that could result in long-term benefits to some fisheries in localized areas. Therefore, no adverse impacts on fisheries or aquaculture associated with these projects are expected, and this resource area was not carried forward for detailed analysis. Recreational fisheries are analyzed as part of Tourism and Recreation.

4.2.2.4 Marine Transportation

Marine transportation, including marine vessel traffic patterns, navigation channels, public services or utilities that support those activities have the potential to be affected by alternatives. Some alternatives in this RP/EA include construction in marine waters along the coastline (e.g., paddle-boat docks or small fishing piers). Marine transportation activities are not anticipated to be affected by these alternatives. One alternative would include use of a pipeline for dredged materials disposal in GUIS (FM1, GUIS Beneficial Use of Dredged Materials at Perdido Pass). It is possible that vessels would need to temporarily avoid areas near construction or the pipeline, resulting in negligible to minor adverse effects on marine vessel traffic from this alternative. Marine transportation is not anticipated to be affected by any of the RP/EA alternatives in the long-term. Therefore, this resource area was not carried forward for detailed analysis.

4.2.2.5 Public Health and Safety

None of the alternatives in this RP/EA would affect public health. Two of the alternatives have a potential to adversely affect safety. FM1, St. Vincent National Wildlife Refuge Predator Control would include predator removal using shooting and trapping. However, these activities would be carried out while the public is not present, and the use of poison is prohibited due to the presence of red wolves. Furthermore, shooting and trapping would only be executed by authorized USDA-APHIS-WS, USFWS and/or NWR staff. Threats to public health and safety from construction activities would be mitigated through construction BMPs, including adequate staging of equipment, limitation of public access to equipment and staging area, and reduced park access during construction periods. BMPs in accordance with Occupational Safety and Health Administration (OSHA) and state and local requirements would be incorporated into construction activities onsite to ensure the proper handling, storage, transport and disposal of all hazardous materials. Personal protective equipment would be required for all construction personnel and authorized access zones would be established at the perimeter of the worksite during construction. Therefore the FL TIG determined that this alternative would not adversely affect public safety.

As discussed in Section 4.5.2, the REC1 Perdido Bay Sunset Islands Snorkeling Trail could pose some increased risk of human and boat interactions due to the location of the project near an active boat channel. This project is not preferred.

Projects would comply with Executive Order 13045, “Protection of Children from Environmental Health Risks and Safety Risks” and does not represent disproportionally high and adverse environmental health or safety risks to children in the U.S. Implementation of projects included in the RP/EA would not increase shoreline erosion or create other health and safety concerns. Therefore, this resource area was not carried forward for detailed analysis other than for the projects cited above.

4.2.3 Resources that are Analyzed in Detail in this RP/EA

Resources identified for consideration in the PDARP/PEIS that have not been addressed in Section 4.2 are addressed in greater detail in the remainder of this chapter. These include:

- **Physical Resources** – Geology and Substrates, Hydrology and Water Quality

- **Biological Resources** – Habitats, Wildlife Species, Marine and Estuarine Fauna, Protected Species
- **Socioeconomic Resources** – Socioeconomics, Land and Marine Management, Tourism and Recreational Use, Aesthetics and Visual Resources

This chapter addresses direct, indirect, and cumulative impacts of proposed alternatives. Section 6.6 and Appendix 6.B of the PDARP/PEIS (Cumulative Impacts) are incorporated by reference into the cumulative impacts analysis, including the methodologies for assessing cumulative impacts, identification of affected resources, and the cumulative impacts scenario.

4.3 Alternatives Proposed for Planning and Design

As discussed in the PDARP/PEIS (Chapter 6), a TIG may propose funding a P&D phase (e.g., planning, feasibility studies, design engineering, and permitting) in a plan for a conceptual project, or for studies needed to maximize restoration planning efforts. This would allow the TIG to develop sufficient project information to develop a more detailed analysis in a subsequent restoration plan, or for use in the restoration planning process. The FL TIG proposes five P&D projects in the reasonable range of alternatives. After review, the FL TIG determined that these projects fall within the range of impacts described in Section 6.4.14 of the PDARP/PEIS, providing the NEPA analysis for these five alternatives, and is summarized below and incorporated by reference. Additional details on the projects are provided in Chapter 2 (Section 2.5).

- FM2, Gulf Islands National Seashore (Florida) Night Sky Restoration (P&D; Preferred).
- WQ4, Pensacola Bay Unpaved Roads Initiative (P&D; Preferred).
- WQ7, St. Andrew Bay Unpaved Roads Initiative (P&D).
- WQ11 Lower Suwannee National Wildlife Refuge Hydrologic Restoration (P&D; Preferred).
- WQ12 Lower Charlotte Harbor Flatwoods Hydrologic Restoration Initiative, Yucca Pens Unit (P&D; Preferred).

4.3.1 Environmental Consequences

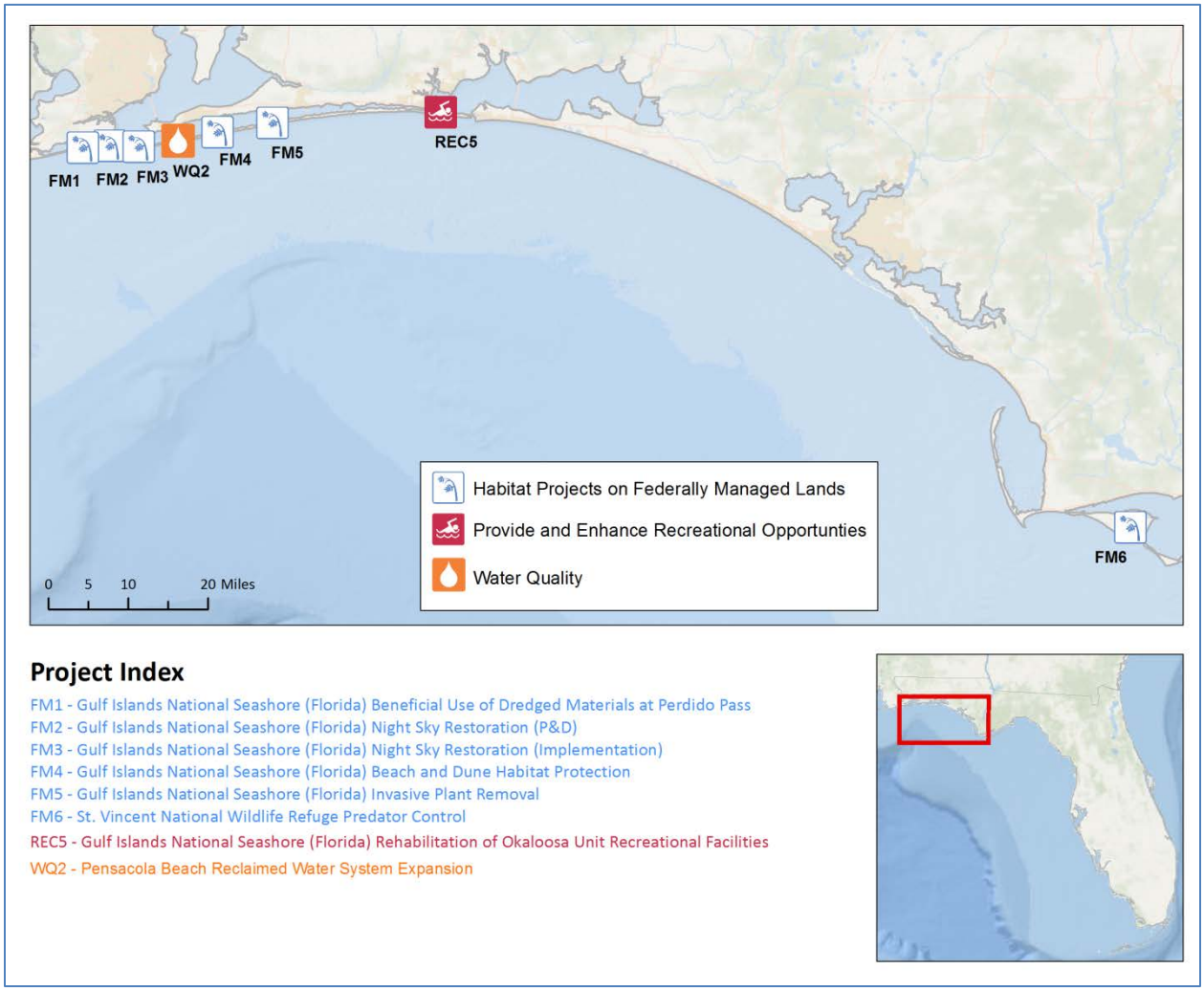
The five P&D projects that are included in this RP/EA include activities such as assessments of existing conditions, modeling of hydrologic responses to the project, and creating maps and scale drawings of project sites. Consistent with the impacts considered in the PDARP/PEIS, these projects would also include minimally intrusive field activities.

Environmental consequences that may occur as a result of these actions are consistent with similar considerations evaluated in other programmatic restoration plans (e.g., the PDARP/PEIS). In particular, the PDARP/PEIS recognizes that project planning, feasibility studies, design and engineering studies, and permitting activities are intended to support the development of projects to propose in more detail in subsequent restoration plans. Preliminary planning phases can increase the effectiveness and efficiency of habitat restoration. Some preliminary phases of project planning would cause direct, short-term, minor impacts through associated fieldwork. Temporary impacts to the biological and physical environment also could include short-term disturbance of habitats and species; and minor disturbance

to terrestrial, estuarine, and marine environments. The five projects included in this plan are anticipated to require only minimal field work and little to no ground disturbances. If subsequent phases of these projects are later proposed for implementation with DWH NRDA funds, a NEPA analysis of the impacts from that project would be included in the associated restoration plan.

4.4 Coastal Barrier Islands

Figure 4-1 Projects in the Coastal Barrier Islands



The coastal barrier islands differ conspicuously from the mainland watersheds in terms of geology as well as habitats and are therefore presented separately in this section. The GUIS GMP (NPS 2014) presents detailed descriptions of the physical and biological features of these islands and was relied upon for the descriptive information provided here unless otherwise cited.

The coastal barrier islands along Florida's northwest coast were formed by wave action and sediment (predominantly sands) delivered by the east to west longshore drift that follows the coastline. Barrier

islands are narrow, sand-dominated islands formed parallel or nearly so to the mainland shoreline and separated from the mainland by bays or lagoons. In addition to sands, tidal marshes and coastal interdunal swales have frequently flooded mucks characterized by organic materials. Surface water flows primarily from ridges and uplands into creeks that flow to the Gulf, although surface sheet flow occurs to a smaller extent. More than 80 percent of GUIS is designated as submerged lands. The waters associated with the barrier islands of the GUIS and the NWR are also designated Outstanding Florida Waters (OFWs) in Florida.

Waters associated with the coastal barrier islands that are verified as not meeting adopted water quality standards to support their designated use, and are therefore designated as impaired, include Santa Rosa Sound on the north side of GUIS, Big Lagoon State Park to the west, and waters surrounding St. Vincent Island. The Clean Water Act requires that the surface waters of each state be classified according to designated uses. Florida has six classes with associated designated uses, four of which are applicable to the project areas in this RP/EA. In order of degree of protection required, the designations are listed below. A more detailed description of classes and specific waterbody designations can be reviewed in 62-302.400, Florida Administrative Code (FAC).

- **Class I - Potable Water Supplies**: Fourteen general areas throughout the state, including impoundments and associated tributaries, certain lakes, rivers or portions of rivers, used as a source of potable water.

- **Class II - Shellfish Propagation or Harvesting**: Generally coastal waters where shellfish harvesting occurs.

- **Class III - Fish Consumption, Recreation, Propagation and Maintenance of a Healthy, Well-Balanced Population of Fish and Wildlife**: The surface waters of the state are Class III unless described in rule 62-302.400, FAC.

- **Class III-Limited – Fish Consumption; Recreation or Limited Recreation; and/or Propagation and Maintenance of a Limited Population of Fish and Wildlife**: This classification is restricted to waters with human-induced physical or habitat conditions that, because of those conditions, have limited aquatic life support and habitat that prevent attainment of Class III uses.

Designated uses for the GUIS and St. Vincent Island include both Class II and Class III waters. Impairments have been identified due to bacteria for the GUIS and both bacteria and nutrients for Class II and III for St. Vincent Island.

Habitats and natural systems of the coastal barrier islands including beaches, foredune and relic dunes, tidal marsh, brackish ponds and lagoons, coastal grasslands, and upland forest and scrub communities, are influenced strongly by tides and storms. Upland animal species are somewhat limited in number on barrier islands because of the low habitat and vegetation diversity, difficult access from mainland areas, and the relatively small land area available on the barrier islands. Vegetation and habitats of the coastal barrier islands are physically constrained by soils (sands), topography, available species, and climate, and change primarily in response to the ability of additional plant species to colonize the islands. Mainland

habitats, in contrast, change over time due to the additional influence of regional vegetation, rainfall patterns, and numerous other factors. Numerous federal and state-listed threatened and endangered species occur on coastal barrier islands and many are endemic due to the isolation imposed by the islands. Federally listed species include the Gulf sturgeon; four sea turtles; terrestrial, sea, and wading bird species; four species of beach mice specific to different portions of the coast; red wolf; West Indian manatee; and four federally listed plant species. These species, along with their federal and state status and corresponding habitats are listed in Appendix E.

Eight projects in this RP/EA are on coastal barrier islands. Six are Habitat Projects on Federally Managed Lands alternatives, one is a Provide and Enhance Recreational Opportunities alternative, and one proposed Water Quality alternative is on a coastal barrier island. As shown in Figure 4-1, projects located on coastal barrier islands are as follows:

- **FM1, Gulf Islands National Seashore (Florida) Beneficial Use of Dredged Materials at Perdido Pass;**
- **FM2, Gulf Islands National Seashore (Florida) Night Sky Restoration (P&D; Preferred);**
- **FM3, Gulf Islands National Seashore (Florida) Night Sky Restoration (Implementation);**
- **FM4, Gulf Islands National Seashore (Florida) Beach and Dune Habitat Protection (Preferred);**
- **FM5, Gulf Islands National Seashore (Florida) Invasive Plant Removal (Preferred);**
- **REC5, Gulf Islands National Seashore (Florida) Rehabilitation of Okaloosa Unit Recreational Facilities (Preferred);**
- **FM6, St. Vincent National Wildlife Refuge Predator Control (Preferred);** and
- **WQ2, Pensacola Beach Reclaimed Water System Expansion (Preferred).**

4.4.1 Gulf Islands National Seashore Projects

GUIS was established by the U.S. Congress on January 8, 1971. As part of the national park system, GUIS encompasses barrier islands and coastal mainland in Mississippi and the western panhandle of Florida. GUIS is comprised of 12 distinct management units stretching along 160 miles from Cat Island in Mississippi to the eastern end of Santa Rosa Island in the northwest section of Florida's panhandle. In Florida, GUIS includes Santa Rosa Island, Perdido Key, and mainland areas in the Naval Live Oaks reservation and Pensacola Naval Air Station (NPS 2014). The current authorized acreage of GUIS is 139,175 acres. Five of the six federally managed lands projects located in GUIS are assessed in this section:

- **FM1, Gulf Islands National Seashore Beneficial Use of Dredged Materials at Perdido Key, Florida**. Location: Southeast shore of Perdido Key on the windward side of the island.
- **FM3, Gulf Islands National Seashore (Florida) Night Sky Restoration (Implementation)**. Location: Project area would likely include the cities of Pensacola, Warrington, Pensacola Beach, and other nearshore communities.
- **FM4, Gulf Islands National Seashore (Florida) Beach and Dune Habitat Protection (Preferred)**. Location: Perdido Key (920 acres), Fort Pickens (1,410 acres), and Santa Rosa (1,290 acres) for a total project area of 3,620 acres.

- **FM5, Gulf Islands National Seashore (Florida) Invasive Plant Removal (Preferred).** Location: Perdido Key (30 acres), Fort Pickens (110 acres), and Santa Rosa (30 acres) for a total of 170 acres treated.
- **REC5, Gulf Islands National Seashore (Florida) Rehabilitation of Okaloosa Unit Recreational Facilities (Preferred).** Location: Unincorporated community of Pensacola Beach on Santa Rosa Island.

The assessment for the **FM2, Gulf Islands National Seashore (Florida) Night Sky Restoration (P&D)** is included under Section 4.3, Alternatives Proposed for Planning and Design. The remaining federally managed project (**FM6, St. Vincent National Wildlife Refuge Predator Control**) is located in St. Vincent Island NWR at the eastern end of the coastal barrier islands in Apalachicola Bay and is described in Section 4.4.2.

The GUIS GMP (NPS 2014) provides extensive information about the coastal barrier islands in the western panhandle and provides the basis of the information presented in the Affected Environment for the five proposed projects within GUIS unless otherwise cited.

4.4.1.1 GUIS Affected Environment

This section describes the Affected Environment for the five projects that would be implemented on GUIS and therefore share potentially affected resources. Section 4.4.1.6 below provides additional affected environment details for the parcel in which REC5, Gulf Islands National Seashore (Florida) Rehabilitation of Okaloosa Unit Recreational Facilities occurs. The Florida portion of GUIS extends north to the south boundary of the Intracoastal Waterway in the area north of Santa Rosa Island and Big Lagoon. Pensacola Bay, Big Lagoon, and the area north of Santa Rosa Island are connected to the Gulf of Mexico through Pensacola Pass. The portion of the area north of Santa Rosa Island, adjacent to the GUIS, is approximately 2 miles wide. Big Lagoon is a 0.75-mile-wide lagoon connected to Perdido Bay. The GUIS southern boundary extends 1 mile out into the Gulf of Mexico.

Physical Resources

Although barrier islands typically buffer the mainland coast from wind and waves, in Florida the dune fields along Santa Rosa Island and Perdido Key have been scoured away and nearly reduced to a rise of only a few feet above sea level. This has led to problems with even minor storms pushing Gulf waters across the barrier islands. Storms and hurricanes result in substantial damage to roads and infrastructure, as well as historic structures and existing campgrounds and utilities.

GUIS has gently sloping areas associated with active and ancient sand dunes and sand hills interspersed within an otherwise level land surface. Dune and beach soils are excessively drained quartz sands and water is only available to vegetation from the surficial groundwater table. Soils at GUIS are greatly weathered and leached, with little organic material, low natural fertility, and high acidity, and beach deposits are mostly quartz sand with varying amounts of clay, silt, and shell fragments. In marshes and interdunal swales, the soils have weathered and accumulated organic matter, resulting in wetland soils and corresponding plants. Soils in the Florida units of GUIS have low to moderate vulnerability to climate change.

The Florida section of GUIS is in the Pensacola Bay and Perdido River and Bay watersheds. The waters in GUIS have special protection and a strict dredging and filling permit review process due to their OFW designation by FDEP, and routinely undergo water quality monitoring by entities including Florida counties and NPS. Waters surrounding Perdido Key and Fort Pickens are suitable for recreational purposes and for the maintenance of well-balanced fish and wildlife populations while waters north of Santa Rosa Island are of even higher quality and suitable for shellfish harvesting. However, land use strongly influences the biology, chemistry, and ecology of the GUIS and has contributed to pollutant loading in stormwater runoff, changes in groundwater recharge rates, oil and gas emissions from watercraft, atmospheric deposition of heavy metals, sewage effluent disposal, and loss of SAV due to degraded water quality. Sensitive aquatic systems around GUIS that may be affected by water quality include SAV and associated fauna, marshes, and nektonic communities (fish, reptiles, and marine mammals). The waters in Pensacola Bay and Santa Rosa Sound are impaired due to bacteria.

Further information about geology and substrates can be found in the Soils section in Chapter 3 of the GUIS GMP (NPS 2014), and further information about hydrology and water quality can be found in the Water Quality section in Chapter 3 of the GUIS GMP (NPS 2014).

Biological Resources

Habitats along GUIS include freshwater and salt marshes, lagoons, bayhead swamps, beaches, dunes, coastal grasslands, longleaf pine savannas and wet pine flatwoods, maritime and southern mixed hardwood forests, and interdunal swales. The vegetation that grows in this environment plays a critical role in the formation, growth, shape and eventually stabilization if conditions allow within the dune environment. The instability, poor soil nutrients, and almost nonexistent soil moisture make plant establishment very difficult in this environment. Primary dunes are dynamic because of the constant movement of sand causing dunes to build, blowout, and migrate. Primary dunes also bear the brunt of storms that often remove great volumes of sand from the dunes. Other sources of habitat damage and loss in the GUIS include development and roads, pedestrian and vehicle traffic, trash accumulation, loose dogs, and nonnative and invasive species. There are several areas in the GUIS that may be seasonally closed due to potential negative impacts of visitors on nesting of federal and state listed shorebirds. Pedestrians, bicyclists, and vehicles can also cause mortality to birds and turtles. Parking is an issue in the GUIS due to vehicles parked on sensitive vegetation outside designated areas.

The diverse habitats in GUIS also support numerous nonnative terrestrial and aquatic vegetation species. A total of 24 nonnative plant species have been found in GUIS with new species introduced each year. Invasive species removal in GUIS is led by NPS staff under SOPs. Mechanical removal is considered the primary method, while chemical control is a secondary method provided that certain requirements are met. GUIS actively collaborates with NPS exotic plant management teams, local municipalities, the State of Florida, and researchers from Florida and Mississippi to determine the best approaches to managing each nonnative species.

The health of SAV and cover by SAV beds has been declining for the past 60 years. All SAV beds within the marine environment now managed by GUIS have extensively declined or in some cases have disappeared. The disappearance of SAV and SAV beds is attributed to increased turbidity caused by

harbor and Intracoastal Waterway dredge and fill activities; boat traffic; shoreline modification; adjacent development leading to reduced water quality; and natural events such as tropical storms, hurricanes, and changes in salinity. Seashore and surrounding waters are vital nursery areas for Gulf of Mexico fisheries. Dominate SAV species found in GUIS waters include shoal grass, turtle grass, and manatee grass. Brackish water species that grow with these three species in locations where saline concentrations are lower include widgeon grass, star grass, and tape grass.

Invasive plants of particular concern at GUIS include torpedo grass, cogon grass, lantana, Chinese tallow, and Japanese privet hedges. New occurrences such as kudzu, Japanese climbing fern, rattle box, and water hyacinth, are actively managed to control the size of emerging infestations. Chinaberry and mimosa are almost eradicated from the GUIS. Repeated disturbance from recent hurricanes has exacerbated the persistence of many invasive plants, especially torpedo grass, cogon grass, and Chinese tallow. Construction activity in and near GUIS is also a source of new infestations, as improperly sanitized vehicles and equipment can transport invasive plant seeds. GUIS users' vehicles and boats, and both regulated and unregulated visitor activities, are also sources of new infestations.

Additional information about habitats in Florida sections of GUIS can be found in the Wetlands and Terrestrial Vegetation and Wildlife sections in Chapter 3 of the GUIS GMP (NPS 2014).

More than 200 species of fish occur within the waters of GUIS including several commercially and recreationally important species. Speckled sea trout spawn around the islands and are often the most sought-after sport fish. Waters surrounding GUIS provide EFH for shrimp, snappers, red drum, and Spanish mackerel.

Common smaller native mammal species found in the Florida and Mississippi districts include marsh rabbit, eastern cottontail rabbit, opossum, squirrel, skunks, gray fox, raccoon, eastern wood rats, hispid cotton rats, eastern moles, southeastern pocket gophers, short-tailed shrews, and a variety of bats. River otters can also be found in the canals near Fort Pickens in Florida.

GUIS has more than 280 species of birds that use the islands for loafing, nesting, feeding, wintering, or migratory rest stops. These birds include songbirds, waterfowl, wading birds, birds of prey, marine birds, and shorebirds. Sandpipers, herons, egrets, ospreys, marsh wrens, terns, gulls, and several species of rails are just a few species that use the island habitats. Shorebird nesting, foraging, and loafing areas occur along both north and south shorelines of GUIS and the Naval Live Oaks Area in Florida. Shorebird colonies along Fort Pickens Road and J. Earle Bowden Way are managed through law enforcement, signs, and closures because the roads bisect breeding bird habitat due to impacts to colonies of black skimmer, piping plover, least tern, and other shorebirds. Great blue heron and night heron nest and roost on Perdido Key and Santa Rosa Island. Ospreys nest on Santa Rosa Island and in the Naval Live Oaks Area.

Several of the federally listed threatened and endangered species found in GUIS are not documented as occurring in the five project areas due to absence of appropriate habitat, including the Alabama red-bellied turtle, dusky gopher frog, and Mississippi sandhill crane. The current federal species list, as

identified through USFWS Information for Planning and Consultation (IPaC), for the five-project area is summarized in Table 4-2 (USFWS 2018a). These species are described further in Appendix E.

Table 4-2 Federally listed species potentially occurring in the Gulf Islands National Seashore (Florida)

Common Name	Scientific Name	Habitat	Status	Likelihood
Florida perforate cladonia	*Cladonia perforata*	Well-drained sands of rosemary scrub habitat.	E	Unlikely
Gulf sturgeon	*Acipenser oxyrinchus desotoi*	Estuarine: various; Marine: various habitats; Riverine: alluvial and blackwater streams.	T	Likely
Reticulated flatwoods salamander	*Ambystoma bishopi*	Palustrine: wet flatwoods, dome swamp, basin swamp; Terrestrial: mesic flatwoods (reproduces in ephemeral wetlands within this community).	E	Unlikely
Eastern indigo snake	*Drymarchon corais couperi*	Terrestrial: mesic flatwoods, upland pine forest, sandhills, scrub, scrubby flatwoods, rockland hammock, ruderal.	T	Unlikely
Gopher tortoise	*Gopherus polyphemus*	Terrestrial: sandhills, scrub, scrubby flatwoods, xeric hammocks, coastal strand, ruderal.	C	Unlikely
Green sea turtle	*Chelonia mydas*	Stays near the coastline and in bays near SAV habitats. They breed adjacent to the shoreline, and nest on sandy beaches.	T	Potentially
Hawksbill sea turtle	*Eretmochelys imbricata*	Forages around coral reefs; spends time in bays and estuaries. They breed adjacent to the shoreline, and nest on sandy beaches.	E	Potentially
Kemp's Ridley sea turtle	*Lepidochelys kempii*	Forage in sargassum and open waters. They breed adjacent to the shoreline, and nest on sandy beaches.	E	Unlikely
Leatherback sea turtle	*Dermochelys coriacea*	Forages in the open ocean waters. They breed in deep waters adjacent to the shoreline, and nest on sandy beaches.	E	Unlikely
Loggerhead sea turtle	*Caretta caretta*	Forages in the open ocean and shallow coastal waters. They breed adjacent to the shoreline, and nest on sandy beaches.	T	Potentially
American alligator	*Alligator mississipiensis*	Estuarine: herbaceous wetland Riverine: river, creek, low gradient, medium river, pool, spring/spring brook Lacustrine: shallow water Palustrine: forested wetland, herbaceous wetland, riparian, scrub-shrub wetland	SAT	Potential
Piping plover	*Charadrius melodus*	Estuarine: exposed unconsolidated substrate; Marine: exposed unconsolidated substrate; Terrestrial: dunes, sandy beaches, and inlet areas; mostly wintering and migrants.	T	Likely
Red knot	*Calidris canutus rufa*	Estuarine: bays, tidal flats, salt marshes; Terrestrial: sandy beaches; Marine: aerial, near shore.	T	Likely
Red-cockaded woodpecker	*Picoides borealis*	Terrestrial: mature pine forests.	E	Unlikely
Wood stork	*Mycteria americana*	Estuarine: marshes; Lacustrine: floodplain lakes, marshes (feeding); Palustrine: marshes, swamps, roadside ditches.	T	Unlikely
West Indian manatee	*Trichechus manatus*	Estuarine: SAV, open water; Marine: open water, SAV.	T	Likely
Perdido key beach mouse	*Peromyscus polionotus trissyllepsis*	Terrestrial: sand dunes with a moderate cover of grasses and forbs.	E	Likely

Common Name	Scientific Name	Habitat	Status	Likelihood
Note: Species determined to be "Unlikely" to be found in the action area are not addressed further in this analysis. E=Endangered, T=Threatened, SAT=Similarity of Appearance (Threatened), C=Candidate, SSC=Species of Special Concern, CH=Critical Habitat.				

Non-native wildlife species found in GUIS include Norway rat, armadillo, coyotes, wild hogs, red fox, and black rat as well as aquatic organisms such as various jellyfish, clams, crabs, fish, snails, bacteria, and viruses. These are potentially invasive or harmful and are therefore managed if necessary.

Additional information about wildlife, vegetation, and invasive species in the GUIS can be found in Chapter 3 of the GUIS GMP (NPS 2014).

Socioeconomic Resources

GUIS is the most heavily visited seashore and one of the 10 most visited park units in the national park system. The Florida sections of GUIS receive approximately 75 percent of the total visitors to GUIS. Most visitors come from within a 500-mile radius, including the states of Georgia, Alabama, Florida, Mississippi, Tennessee, Louisiana, Texas, and Arkansas. Changes in annual visitation and visitation patterns to GUIS are influenced by hurricanes and other strong coastal storms. Hurricanes can close bridges and destroy piers, beaches, and visitor facilities. Historical features play a highly visible and important role in the overall visitor enjoyment and national significance of GUIS. The forts of GUIS span more than 200 years of history, from the Spanish colonial Bateria de San Antonio (1797) to the World War II-era Battery 234.

Five counties are adjacent to GUIS—Escambia, Santa Rosa, and Okaloosa counties in Florida; and Jackson and Harrison counties in Mississippi. In Florida, the largest industry sector is the services sector, which employs 73,340 persons, followed by retail trade (41,850 persons), military and DOD civilians (23,446 persons), state and local government (21,710 persons), and construction (16,110 persons). A study by Livingston and Arthur (2002) found that tourism is a strong component of growth of retail and service-based businesses within the Pensacola region and that tourism is a direct result of the quality and amount of seashore beaches. The Pensacola economy also remains dependent on military and defense industry spending.

Currently, GUIS is used for recreational activities such as camping, hiking, fishing, biking, swimming, boating, and bird-watching. More information about tourism and recreation can be found in the "Visitor Use and Experience Topics Analyzed in Detail" and "Social and Economic Environment Topics Analyzed in Detail" sections of Chapter 3 in the GUIS GMP (NPS 2014).

4.4.1.2 FM1, Gulf Islands National Seashore (Florida) Beneficial Use of Dredged Materials at Perdido Pass

This project would improve and increase beach habitat on the Gulf of Mexico side of Perdido Key. The project would address the unnaturally eroded beach by re-introducing sand back into the barrier island system along the southeast shore of Perdido Key, and it would also increase sandy habitat elsewhere on the Key, north of the primary dune line. Specifically, the project activities most relevant to assessment of the environmental consequences of this project include:

- Re-introduction of sand into the barrier island system through swash zone placement (or other method). A pipeline would be run from the dredging operation at Pensacola Pass to the swash zone of the project site (the part of the beach that has the turbulent layer of water of broken waves washing in and out over it, generally between three and 12 feet below mean low water line).
- Restoration activities to place suitable sand material from sources outside the natural sources of sediment for the eroding beach, including a borrow site where the physical and chemical sediment characteristics closely match those at the restoration site.
- Environmental compliance surveys in the sand placement zone including cultural and natural resources surveys, project monitoring, and oversight.

This project would not include the dredging activities, as these activities are already permitted, undertaken, and overseen by USACE. This project would help restore dunes and beaches that provide important coastal habitat for shorebirds, beach mice, and sea turtles. The project would also serve to restore popular recreational areas for local visitors and tourists.

The USACE Lower Pensacola Harbor Federal Navigation Channel Environmental Assessment and Finding of No Significant Impact (USACE 2010 EA/FONSI) provides extensive information on a similar USACE project in the same location that involved actions very similar to the proposed restoration activities. The USACE 2010 EA/FONSI is primarily referenced in the Environmental Consequences section unless otherwise cited. Additional details on the project are provided in Chapter 2 (Section 2.5.1).

Resources Analyzed in Detail for this Alternative

Table 4-3 identifies how potentially affected resources are analyzed in this RP/EA for this alternative. In particular, it identifies whether resources were addressed in Section 4.2 (Resources Not Analyzed in Detail in this RP/EA), as well as resources that do not require additional analysis for this alternative because they are unaffected by it, or the impacts would be so minor that a more detailed NEPA analysis is not needed. It also identifies resources that are analyzed in detail.

Table 4-3 NEPA Assessment of Resources for this Alternative

Resource	Location of Analysis in Chapter 4
Physical Resources	
Geology and Substrates	Section 4.4.1.2
Hydrology and Water Quality	Section 4.4.1.2
Air Quality and Greenhouse Gas Emissions	Section 4.2
Noise	Section 4.2
Biological Resources	
Habitats	Section 4.4.1.2
Wildlife Species (including birds)	Section 4.4.1.2
Marine and Estuarine Fauna (fish, shellfish, benthic organisms)	Section 4.4.1.2
Protected Species	Section 4.4.1.2
Socioeconomic Resources	

Resource	Location of Analysis in Chapter 4
Socioeconomics	Section 4.4.1.2
Environmental Justice	Section 4.2
Cultural Resources	Section 4.2
Infrastructure	Project activities would not affect public services or utilities.
Land and Marine Management	Project activities would not require a variance or zoning change or an amendment to a land use, area comprehensive, or management plan.
Tourism and Recreational Use	Section 4.4.1.2
Fisheries and Aquaculture	Section 4.2
Marine Transportation	Section 4.2
Aesthetics and Visual Resources	The pipeline to transport dredged material to the swash zone would not be visible (underwater).
Public Health and Safety, Including Flood and Shoreline Protection	Section 4.2
Note: Resource does not require additional analysis for this alternative because it is unaffected by the alternative, or the impacts would be so minor that a more detailed NEPA analysis is not needed.	

Environmental Consequences

Only those resource areas for which potential impacts are expected are discussed in detail in this draft RP/EA. The FL TIG analyzed the following resources in more detail below:

- **Physical Resources:** Geology and Substrates, Hydrology and Water Quality
- **Biological Resources:** Habitats, Marine and Estuarine Fauna
- **Socioeconomic Resources:** Tourism and Recreational Use

Physical Resources

The placement of dredge materials along the shore of Perdido Key would alter the geology in the swash zone area and cover existing substrates with new dredged substrate. USACE determined the sediment from the dredge location is compatible with the disposal location:

> "Grain size comparisons were conducted between the core samples taken from the channel and the samples collected from the beach. Grain size and color analysis were conducted on the borings and compared to that of the beach samples to assure compatibility between the proposed dredged material and nearshore disposal area. The results indicate that the materials compare well to the dredge material grain sizes and color presented in the placement plan" (2010).

Coastal ecological resources along the local beach systems have consistently been diminished due to the high shoreline recession rates exhibited in this region, most attributed to hurricanes and tropic storms. The result has been the loss of valuable habitat including sea turtle nesting habitat, shorebird foraging and roosting areas, dune habitat supporting various flora and fauna, and general beach ecosystem functions. Placing quality material in the local Perdido Key littoral system would allow greater stability

and sustainability of the coastal environment once it becomes reestablished, providing long-term benefits to geology and substrates (USACE 2010).

Proposed activities would result in short-term minor adverse impacts to water quality (USACE 2010). Due to the predominant sandy nature of the material being dredged (beach quality sand), the quantity of silt is expected to be low and not a significant problem (USACE 2010). The sandy material being dredged and placed on the designated beach and nearshore areas is littoral sand form the same source as the sand found within these proposed disposal sites. Previous operations and water quality certifications has found that the material dredged from the site is free of contaminants (USACE 2010).

In summary, this project would result in short-term minor adverse impacts to physical resources as well as long-term benefits to physical resources.

Biological Resources

The benthos within the channel and swash zone placement site would be lost during dredging and placement activities; however, it is believed that affected areas should repopulate once the project activities are complete and should rapidly recover. Turbidity levels would increase during the dredging and placement operations. BMPs would be used to minimize turbidity impacts to adjacent biological resources during placement operations. BMPs to be used include ensuring borrow material is compatible with the native beach sand to avoid problems and monitoring turbidity levels during placement activities. It is anticipated that the levels of turbidity would subside shortly after dredging operations is complete. Due to the nature of the existing shallow water bottoms there should be no basic change in overall productivity. However, the project would provide a beneficial impact by maintaining existing habitat for the local benthos (USACE 2010).

There would be temporary disruption of the aquatic community caused by the dredging and placement activities. Non-motile benthic fauna within the area would be destroyed by dredging and placement operations but should repopulate within 12 months upon project completion. Some of the motile benthic and pelagic fauna, such as crabs, shrimp, and fishes can avoid the disturbed area and should return shortly after the activity is completed. Larval and juvenile stages of these forms may not be able to avoid the activity due to limited mobility. Losses to the benthic and pelagic fauna should not be significant due to the small area (percentage wise) of ecosystem that would be affected at any given time (USACE 2010).

The most vulnerable organisms during this action would be benthic animals, such as polychaete worms, shrimp, and crabs. Placement of dredged material could temporarily disrupt the benthic communities occupying these areas. Adjacent benthic communities are anticipated to move into the dredged and placement site and begin re-colonization. Temporarily reduction of light penetration may affect primary production by phytoplankton zooplankton populations. However, due to the nature of the materials to be utilized these impacts would be short-term in nature. On the contrary, the project would maintain existing habitat which would be beneficial for the coastal fauna (USACE 2010).

Proposed activities would not adversely impact or threaten the continued existence of any threatened or endangered species potentially occurring in the project area (USACE 2010). This is conditional that

efforts would be made to conduct the placement of the beach quality sand during the most desirable environmental windows to the maximum extent practicable (USACE 2010). Proposed activities would result in no significant adverse impact to fish and wildlife resources (USACE 2010). The FL TIG would coordinate and complete consultation with relevant regulatory agencies, if necessary, on this project regarding potential impacts to protected species and habitats prior to project implementation.

In summary, the project may result in short-term minor adverse impacts to biological resources, including benthic habitat and resources, due to the temporary disruptions during dredging and placement activities, but no long-term adverse impacts are anticipated. Further, the project would provide benefits to the benthic habitat and coastal fauna.

Socioeconomic Resources

For a short time, the construction process would limit recreational activities near the dredge pipe and equipment staging areas. These short-term closures would result in minor adverse effects to visitors. However, once completed, the project would maintain more esthetically pleasing beaches and vegetated dunes which would supply more area for active and passive recreational activities, resulting in a medium to long-term benefit to recreators (USACE 2010).

In summary, the project would result in short-term minor adverse effects to visitors, but would also result in long-term benefits to recreators.

4.4.1.3 FM3, Gulf Islands National Seashore (Florida) Night Sky Restoration (Implementation)

This project would provide a wide range of environmental benefits to federally managed habitat at GUIS as well as nearby coastal and marine habitats by reducing nighttime light pollution in GUIS.

This project would be designed based on the information gained through Phase I of the project and would depend on a) the results of the lighting inventory and the sky brightness measurements, b) the number and location of willing municipalities, businesses, and private citizens, and c) funding limitations. The assessment for the Gulf Islands National Seashore (Florida) Night Sky Restoration - Phase I (FM2) is described in Section 4.3, Alternatives Proposed for Planning and Design. In general, the Phase II project would include:

- Public outreach activities to identify willing participants;
- Development of site-specific “Individual Lighting Plans” to replace existing luminaires and bulbs on properties of willing municipalities/businesses/property owners;
- Implementation of outdoor lighting upgrades (which lights to target and what types of luminaires/bulbs to install would be based on the findings of Phase I of the project) in communities that affect habitats at GUIS. This could include lighting hardware improvements (e.g., luminaires, bulbs, controls) in municipal (e.g., streetlights, parking lots), commercial (e.g., buildings, parking lots), and private settings (e.g., homes, condominiums);
- Enhancement of lighting practices (e.g., illumination schedules);
- Monitoring activities including before-and-after lighting impact assessments.

The project would be implemented by the NPS's Natural Sounds and Night Skies Division.

Resources Analyzed in Detail for this Alternative

Table 4-4 identifies how potentially affected resources are analyzed in this RP/EA for this alternative. In particular, it identifies whether resources were addressed in Section 4.2 (Resources Not Analyzed in Detail in this RP/EA), as well as resources that do not require additional analysis for this alternative because they are unaffected by it, or the impacts would be so minor that a more detailed NEPA analysis is not needed. It also identifies resources that are analyzed in detail.

Table 4-4 NEPA Assessment of Resources for this Alternative

Resource	Location of Analysis in Chapter 4
Physical Resources	
Geology and Substrates	Outdoor lighting upgrades and monitoring activities would not have an impact on geology, substrates.
Hydrology and Water Quality	Outdoor lighting upgrades and monitoring activities would not have an impact on hydrology or water quality.
Air Quality and Greenhouse Gas Emissions	Section 4.2
Noise	Section 4.2
Biological Resources	
Habitats	Section 4.4.1.3
Wildlife Species (including birds)	Section 4.4.1.3
Marine and Estuarine Fauna (fish, shellfish, benthic organisms)	Section 4.4.1.3
Protected Species	Section 4.4.1.3
Socioeconomic Resources	
Socioeconomics	Section 4.4.1.3
Environmental Justice	Section 4.2
Cultural Resources	Section 4.2
Infrastructure	Outdoor lighting upgrades and monitoring activities do not involve a change in land and marine management in the project area of GUIS.
Land and Marine Management	Infrastructure would be minimally affected by upgrading lights.
Tourism and Recreational Use	Section 4.4.1.3
Fisheries and Aquaculture	Section 4.2
Marine Transportation	Section 4.2
Aesthetics and Visual Resources	Outdoor lighting upgrades would take place in population centers. Monitoring activities to perform lighting assessments would not affect tourism or recreation
Public Health and Safety, Including Flood and Shoreline Protection	Section 4.2
Note: Resource does not require additional analysis for this alternative because it is unaffected by the alternative, or the impacts would be so minor that a more detailed NEPA analysis is not needed.	

Environmental Consequences

Only those resource areas for which potential impacts are expected are discussed in detail in this draft RP/EA. The FL TIG analyzed the following resources in more detail below:

- **Biological Resources:** Habitats, Wildlife Species, Protected Species, Marine and Estuarine Fauna
- **Socioeconomic Resources:** Socioeconomics, Aesthetics and Visual Resources

Biological Resources

Project activities would have beneficial effects on biological resources including habitats, wildlife, protected species, and marine and estuarine fauna. Nighttime light pollution and sky glow can alter daily and seasonal light cycles which impact all marine and coastal species Specifically, light pollution can negatively impact light cycles which drive fish migrations, marine invertebrate larvae dispersal and settlement, and nearshore species' feeding and predator-prey relationships. The DWH Oil Spill Phase II Early Restoration Plan and Environmental Review (Phase II ERP) recognized that artificial lights that illuminate beaches result in reduced sea turtle nesting activity on beaches and disorientation of hatchlings (DWH Trustees 2012). The Restoring the Night Sky Project described in the Phase II ERP intended to enhance habitat for loggerhead sea turtles by reducing the amount of light cast onto beaches in the Florida Panhandle and Gulf State Park (DWH Trustees 2012). These actions were also expected to benefit other resident native species including migratory birds, beach nesting birds and sea turtles, beach mice, bats, amphibians and other reptiles, are expected to occur as a result of this project. The Phase II plan categorically excluded this project from further NEPA evaluation because it was anticipated to only result in minor or negligible changes in the use of project areas by resident species and fell within the DOI categorical exclusions 516 DM 8.5A(2), 516 DM 8.5B(2), and 516 DM 8.5(11) (DWH Trustees 2012).

The FL TIG would coordinate and complete consultation with relevant regulatory agencies, if necessary, on this project regarding potential impacts to protected species and habitats prior to project implementation. In summary, consistent with the Phase II ERP, this project is also anticipated to result in minor or negligible adverse impacts to the environment, and would result in benefits to biological resources.

Socioeconomic Resources

Because there is little ground disturbance or construction anticipated as part of this project, it is anticipated to have none to negligible effects on most aspects of socioeconomic resources. This project is anticipated to have largely beneficial impacts on aesthetics, and visual resources because night-time lighting would be softer and less glaring. Improvements in lighting hardware and lighting schedules should also reduce maintenance and electricity costs. In summary, this project would result in largely beneficial impacts to socioeconomic resources.

In summary, the project would have none to negligible efforts on socioeconomic resources, and would result in benefits, such as softer lighting and reduced electricity costs.

4.4.1.4 FM4, Gulf Islands National Seashore (Florida) Beach and Dune Habitat Protection (Preferred)

The project would be implemented by the DOI FL TIG Trustee in coordination with the NPS and GUIS staff and other project partners, including USDA-APHIS-WS, University of Florida (UF), FWC, USFWS, and Audubon. This project would continue and expand on NRDA-funded shorebird work that is ending in the park after the 2017 nesting season. The project area covers approximately 3,620 acres: 920 acres at Perdido Key, 1,410 at Fort Pickens, and 1,290 at Santa Rosa. The project would protect beach habitat at GUIS and associated wildlife from three different threats: 1) humans on beaches disturbing birds and destroying nests; 2) unnaturally high numbers of predators such as coyotes, ghost crabs and fish crows; and 3) collisions with vehicles on the paved roads through these areas.

Specifically, this project would include:

- Measures to temporarily close sensitive areas to protect habitat, wildlife, and nests and to prevent dune trampling and disturbance including symbolic fencing (e.g., post and rope fencing to show the boundary of the closed area), enforcement patrol support, and/or the establishment of wildlife viewing areas at the edge of major bird colonies;
- Public outreach materials to educate visitors on the habitats and wildlife (including breeding birds) such as score cards of hatches and mortality provided at the entrance stations;
- Predator management activities, such as perch deterrents, nest enclosures, and eradication methods would be used to control populations and reduce impacts to shorebirds and sea turtles;
- Law enforcement patrols to monitor and control vehicle speeding rates and reduce vehicle collisions with wildlife;
- Monitoring and demographic surveys of individual animal and bird burrows, nests, and colonies for predator activity, human encroachment, and to measure nesting and hatch rates (for birds) and provide insights into causes of mortality and allow for adaptive management throughout the project by identifying the most effective closure areas and protection methods that minimize impacts on human beachgoers.

The 2016 NPS Environmental Assessment to Improve Barrier Island Habitat and Visitor Access at Perdido Key/Johnson Beach Area (hereafter referred to in this section as the NPS EA) provides information on a similar GUIS project (construction in the beach and dune habitat) in the same location (NPS 2016). The GUIS GMP (NPS 2014) provides information on closures and monitoring for wildlife. These resources are cited below and incorporated by reference where applicable.

Resources Analyzed in Detail for this Alternative

Table 4-5 identifies how potentially affected resources are analyzed in this RP/EA for this alternative. In particular, it identifies whether resources were addressed in Section 4.2 (Resources Not Analyzed in Detail in this RP/EA), as well as resources that do not require additional analysis for this alternative because they are unaffected by it, or the impacts would be so minor that a more detailed NEPA analysis is not needed. It also identifies resources that will be analyzed in detail.

Table 4-5 NEPA Assessment of Resources for this Alternative

Resource	Location of Analysis in Chapter 4
Physical Resources	
Geology and Substrates	Section 4.4.1.4
Hydrology and Water Quality	Project activities would not include any in-water work or disruptions to hydrology or water quality on the islands.
Air Quality and Greenhouse Gas Emissions	Section 4.2
Noise	Section 4.2
Biological Resources	
Habitats	Section 4.4.1.4
Wildlife Species (including birds)	Section 4.4.1.4
Marine and Estuarine Fauna (fish, shellfish, benthic organisms)	Project activities would not include any in-water work and have no effect on marine or estuarine fauna.
Protected Species	Section 4.4.1.4
Socioeconomic Resources	
Socioeconomics	Section 4.4.1.4
Environmental Justice	Section 4.2
Cultural Resources	Section 4.2
Infrastructure	Section 4.4.1.4
Land and Marine Management	Project activities would not require a variance or zoning change or an amendment to a land use, area comprehensive, or management plan.
Tourism and Recreational Use	Section 4.4.1.4
Fisheries and Aquaculture	Section 4.2
Marine Transportation	Section 4.2
Aesthetics and Visual Resources	Section 4.4.1.4
Public Health and Safety, Including Flood and Shoreline Protection	Section 4.2
Note: Resource does not require additional analysis for this alternative because it is unaffected by the alternative, or the impacts would be so minor that a more detailed NEPA analysis is not needed.	

Environmental Consequences

Only those resource areas for which potential impacts are expected are discussed in detail in this draft RP/EA. The FL TIG analyzed the following resources in more detail below:

- **Physical Resources:** Geology and Substrates
- **Biological Resources:** Habitats, Wildlife Species, Protected Species
- **Socioeconomic Resources:** Socioeconomics, Tourism and Recreational Use, Aesthetics and Visual Resources, Infrastructure

Physical Resources

Proposed activities that would disturb beach and dune substrates in the project areas include the installation of symbolic fencing surrounding the nesting areas (e.g., post and rope fences) and the

potential for construction of bird viewing areas outside the nesting areas. Construction of similar structures, such as dune crossovers on Perdido Key, was discussed in the NPS EA to Improve Barrier Island Habitat and Visitor Access at Perdido Key/Johnson Beach Area. The NPS EA found beneficial impacts would result from focusing foot traffic to the dune crossovers, as they would reduce the number of visitors cutting through sensitive dune habitat and would protect the dune ecosystems (NPS 2014). All efforts to stabilize the dune systems and associated dune vegetation would strengthen the natural barrier of defense against storms and erosion in this area because dunes absorb the impact of storm surge and wave action (NPS 2014). In a similar manner, symbolic fencing and specified wildlife viewing area construction would route visitors off the beaches and dunes near nesting sites and have a beneficial impact on the substrates on Perdido Key, Fort Pickens, and Santa Rosa beach. The NPS EA found that the "increase in habitat area for vegetation to stabilize would attribute a substantial beneficial impact to floodplains through dune vegetation and stability within the Perdido Key/Johnson Beach Area, because the impact would be a permanent benefit to dune vegetation with resulting dune stabilization in this localized area" (NPS 2014).

In summary, the project is anticipated to result in short-term minor adverse and long-term benefits to physical resources.

Biological Resources

This project would restore dunes and beaches that provide important coastal habitat for birds, beach mice, and sea turtles, allowing it to recover its natural vegetation and processes with as little disturbance as possible. The construction of symbolic fencing and a potential wildlife viewing platform could result in short-term minor adverse impacts, which the NPS found may result in the removal or damage of small amounts of dune vegetation. Long-term beneficial impacts to vegetation would result from use of the new wildlife viewing area and the addition of fencing around nesting areas that would direct visitors to the viewing area and further discourage visitors from walking through the dune habitat (NPS 2014). Reducing speeds on park roads would have a long-term beneficial impact on wildlife by reducing the number of animals killed by vehicles each year. The FL TIG has begun coordinating with the relevant regulatory agencies related to potential impacts to protected species and habitats.

In summary, the project is anticipated to result in short-term minor adverse and long-term benefits to biological resources.

Socioeconomic Resources

The project would also serve to restore popular recreational areas for local visitors and tourists by installing and enforcing temporary access limitations such as fences and vehicular speed. These techniques would improve habitat connectivity and reduce visitor impacts on habitats and wildlife. The project would be expected to result in short-term increase in demand for construction jobs at GUIS. During the construction phase of this project, as much as possible construction equipment and operations would likely be located along in previously disturbed areas and parking lots. To the extent required, the use of construction equipment would result in some minor to moderate short-term adverse impacts on aesthetics and visual quality. During the construction period, visible impedances would detract from the natural landscape and create visual contrast for observers visiting the project

areas. Short-term closures of public areas may be required to accommodate construction activities, which could adversely affect visitors. Over the long-term, the infrastructure improvements included in this project would impact the appearance of the land, creating a somewhat more developed appearance. Reduction in park road speeds near the beach and dune habitat could result in increased traffic on the island.

In summary, the project is anticipated to result in short-term minor adverse impacts to existing infrastructure and utilities, aesthetics and visual resources, and tourism and recreation. However, the project improvements, including amenities, would provide benefits to visitors over the long-term.

4.4.1.5 FM5, Gulf Islands National Seashore (Florida) Invasive Plant Removal (Preferred)

Invasive species control is proposed throughout the barrier islands of the Florida District of GUIS. This project would treat five of the most problematic invasive species in the Fort Pickens, Santa Rosa, and Perdido Key Areas of GUIS more comprehensively, and collect information on invasives in these areas. The five invasive species are cogon grass, torpedo grass, popcorn trees/Chinese tallow, Cuban bulrush, and beach vitex. The approximate size of the areas that would be covered are Perdido Key – 920 acres, Fort Pickens – 1,410 acres, and Santa Rosa – 1,290 acres. Preliminary estimates of the size of the actual areas to be treated within these larger areas are: 30 acres at Perdido Key, 30 at Santa Rosa, and 110 acres at Fort Pickens (for a rough total of 170 acres). These sizes may change significantly after the inventory. Specific project tasks include:

- Consolidate existing documentation, visit the three areas, and inventory locations and quantity (e.g., area, percent cover) of the five species.
- Prepare a Treatment Action Plan (TAP).
- Treat invasive species intensively per the TAP for five years. The primary treatment method for all species would be foliar chemical treatment using a backpack sprayer, but with additional hand-pulling and other methods (e.g., seed removal, stump treatment) used as needed. Areas would be treated and re-treated as needed for five years with monitoring results dictating the treatment plan for the following year.
- Monitor treatment results during the project.
- Prepare a Project Completion Report (includes recommendations for future treatments). This report could become the basis for an Exotic Plant Management Plan for this area.

Environmental Consequences

Only those resource areas for which potential impacts are expected are discussed in detail in for this alternative. The FL TIG analyzed the following resources in more detail below:

- **Physical Resources:** Geology and Substrates, Hydrology and Water Quality
- **Biological Resources:** Habitats, Wildlife Species, Marine and Estuarine Fauna, Protected Species
- **Socioeconomic Resources:** Socioeconomics, Tourism and Recreational Use, Aesthetics and Visual Resources, Land and Marine Management

The NPS currently manages for invasive species throughout the GUIS. Their management strategies are in line with these project activities, including completing inventories of nonnative species and controlling or eliminating nonnative plants and animals, nonnative diseases, and pest species where there is a reasonable expectation of success and sustainability (NPS 2014). In addition to the five invasive plants addressed in this project there are 19 more nonnative plant species in GUIS with new species introduced each year. Many invasive plants are highly competitive at colonizing disturbed areas and have long-lived seed banks. These species are therefore well-equipped to take advantage of natural disturbances such as those caused by storms and hurricanes, as well as human caused disturbances such as construction zones, non-designated trails, camping areas, and vehicle scarring in undesignated areas (NPS 2014). Mechanical removal is considered the primary method of removal by the NPS, while chemical control is a secondary method provided that certain requirements are met (2014). The GMP states that expanding the nonnative species eradication program would result in beneficial impacts to wildlife and native vegetation.

Pesticide use requests would be submitted to the NPS Pesticide Use Proposal System for approval. NEPA compliance for exotic plant removal typically involves the DOI categorical exclusion (CE) E.2., "Restoration of noncontroversial native species into suitable habitats within their historic range and elimination of exotic species."

Physical Resources

Except for a smattering of freshwater and brackish ponds in each of the three areas, some remnant man-made canals (brackish and freshwater) in the Fort Pickens area, and ephemeral shallow freshwater (from rain) and saltwater (from overwash events) ponds/puddles in all three areas, the project area is devoid of surface water (i.e., no streams or springs). BMPs will be implemented to minimize impacts to WQ when using chemicals to remove invasive species.

In summary, project activities would result in short-term minor adverse impacts to substrates during manual removal of plants, and could have short-term minor adverse impacts on water quality if chemicals are used to remove nonnative species.

Biological Resources

The project area includes critical habitat for loggerhead sea turtles, piping plover, and the Perdido Key beach mouse but project activities would not be anticipated to have an effect on this habitat. Beach vitex plants can inhibit bird and turtle nesting, and alter habitat use by beach mice, and any nonnative plants forming a monoculture in one area can reduce good nesting habitat for shorebirds. Removal of invasive plant species from beach and dune habitat in the project area would generally have long-term beneficial impacts on the species listed in Appendix E. Many species do have a chance of being adversely affected during implementation either by physical disturbance during fieldwork or chemical intoxication during treatments. These field activities would be short lived and would occur in relatively small areas (i.e., approximately 2-8 percent of the total acreage in the three areas). Additionally, herbicide use would follow all NPS protocols to ensure proper and approved chemicals are used, that they are used in the appropriate concentration and amount, and that their application hits target species as precisely as possible with drift onto non-target species minimized. If more than one pesticide is available for use and

all have the same efficacy, the one with the shorter half-life would be used to keep all species as safe as possible. Finally, although there is a window of time in which herbicides can be applied, application would occur as much as possible when nesting populations are lowest and least vulnerable and to minimize effects to migratory bird populations.

Project activities would be conducted, as much as reasonably possible, to be in accordance with the FWC's guidelines developed to protect against potential impacts to nesting shorebirds during the periods from February 15 through August 31, as outlined below:

1. Maintain at least a 300-foot distance from shorebird nesting areas during breeding season, or if birds appear agitated or take flight;
2. Keep out of posted nesting areas;
3. Never intentionally force birds to fly;
4. Avoid running equipment or watercraft close to shore in potential nesting areas.

Personnel associated with the construction and operational phases of the project would be instructed and trained regarding the protection of shorebirds, and personnel would be informed of the civil and criminal penalties for harming, harassing, or killing species that are protected.

Within the national seashore, Florida District, piping plovers are known to winter in tidal flat areas on Perdido Key (NPS 2014). Parts of GUIS have been designated as critical wintering habitat; however, critical habitat does not extend into the action area. Temporary effects to red knots and piping plovers could occur during project activities due to increased noise and heavy equipment. However, any wildlife displaced during project activities would likely return to the area and resume normal behaviors after project activities were completed. The FL TIG has begun coordinating with the relevant regulatory agencies related to potential impacts to protected species and habitats.

In summary, project activities could cause short-term minor adverse impacts to biological resources as a result of physical disturbances, chemical intoxication, or increased noise. However, the project would result in long-term benefits to biological resources as a result of the removal of invasive plant species from beach and dune habitat.

Socioeconomic Resources

The project would be expected to result in short-term increase in demand for jobs at the park. Short-term closures of public areas may be required to accommodate plant removal activities, which could adversely affect visitors.

Threats to public health and safety from invasive plant removal activities are anticipated to be minimal, as activities would be small in scale and conducted by individuals by hand. BMPs in accordance with Occupational Safety and Health Administration (OSHA) and state and local requirements would be incorporated into activities onsite to ensure the proper handling, storage, transport and disposal of all hazardous materials. Personal protective equipment would be required for all construction personnel and authorized access zones would be established at the perimeter of the worksite during activities. –

Removing invasive plants would have a short-term temporary effect on the visual resources of an area until native plants fill in the removal area.

In summary, the project may result in short-term minor adverse impacts to infrastructure, aesthetics and visual resources, and tourism and recreation. However, the project improvements would provide benefits and amenities to park visitors over the long-term.

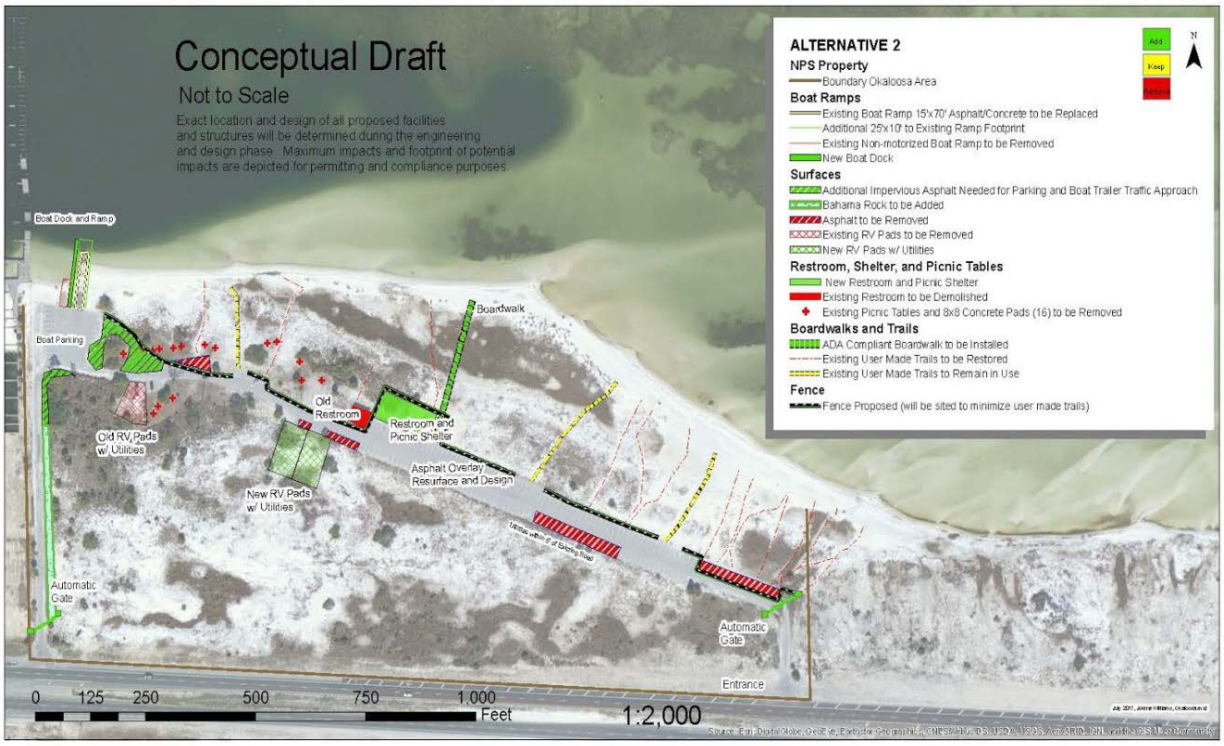
4.4.1.6 REC5, Gulf Islands National Seashore (Florida) Rehabilitation of Okaloosa Unit Recreational Facilities (Preferred)

The Okaloosa Unit of GUIS is approximately 20 acres, bordered to the north by Choctawhatchee Bay, with the Gulf of Mexico to the south, separated by land on the southern side of the peninsula (Figure 4-2). Specifically, the project would include:

- Removal of an existing boat ramp and construction of a new boat ramp;
- Removal of an existing restroom and construction of a new restroom facility;
- Construction of a floating pier, lift station, parking lot (including overflow parking), boardwalk from the parking area to the beach, and fencing of some existing foot paths through beach and dune habitat where pavement is removed;
- Removal of existing parking spaces and pavement, pave additional area for boat launch parking and access, resurface remaining parking lot and entrance/exit road, and add gravel overflow parking area;
- Replacement of electrical systems;
- Removal of existing RV sites and installation of two new RV sites with utility hook-ups;
- Removal of existing picnic tables and concrete pads and construction of a picnic area pavilion with approximately ten picnic tables;
- Installation of automatic gates at the entrance and exit;
- Re-vegetation of some existing foot paths through beach and dune habitat and areas where pavement is removed.

The action area for the project includes frontage on and in-water work in Choctawhatchee Bay. Additional details on the project are provided in Chapter 2 (Section 2.5.4).

Figure 4-2 Okaloosa Unit Recreation Area Proposed Improvements



Affected Environment

The general affected environment for GUIS is provided in section 4.4.1.1. This section provides additional details relevant to the Okaloosa parcel that would be affected by this alternative.

Physical Resources

The Okaloosa Area is located on the Florida Panhandle, on the Okaloosa Unit of the GUIS. Refer to section 4.4.1.1 for a description of Physical Resources for GUIS.

Biological Resources

The environment in the northern segment along Choctawhatchee Bay is mostly sand and coastal grass and shrub habitat, with some developed areas (e.g., parking lot, road, restroom). The proposed improvements are partly on lands that are undeveloped or undisturbed, but most are proposed for areas adjacent to existing developed areas (e.g., RV pads, picnic area, lift station, new restroom). The improvements will utilize existing infrastructure where possible. The additions to the site are proposed on land that may consist of scrub shrub, sand, or coastal dune habitat.

Based on available information, there is SAV in Santa Rosa Sound off the site (NPS 2010). There are dense seagrass beds in Choctawhatchee bay adjacent to the project site. Only the boat ramp and floating pier element of the project might impact these beds. No other marine vegetation in the project area is visible (Google Maps 2018). Essential Fish Habitat (EFH) for coastal migratory pelagics, stone crabs, reef fish, shrimp, and red drum is present in Choctawhatchee Bay (NOAA OR&R, UNH, and EPA 2018). There is in-water work proposed for this project which intersects with EFH.

The list of federally threatened, endangered, proposed, candidate, and other species of concern for this site, as identified through USFWS IPaC, is presented in Table 4-2 (USFWS 2018a). There is no terrestrial critical habitat on the Okaloosa Recreation Area. There is marine critical habitat for Gulf sturgeon in Choctawhatchee Bay (Unit 12; NOAA OR&R, UNH, and USEPA 2018). There is in-water work proposed for this site. A list of all state and federally listed species found in this watershed is presented in Appendix E.

Socioeconomic Resources

Refer to section 4.4.1.1 for a description of Socioeconomic Resources for GUIS.

Environmental Consequences

Only those resource areas for which potential impacts are expected are discussed in detail in for this alternative. The FL TIG analyzed the following resources in more detail below:

- **Physical Resources** – Geology and Substrates, Hydrology and Water Quality
- **Biological Resources** – Habitats, Wildlife Species, Marine and Estuarine Fauna, Protected Species
- **Socioeconomic Resources** – Socioeconomics, Land and Marine Management, Tourism and Recreational Use, Aesthetics and Visual Resources.

Physical Resources

Implementation of this alternative could include use of heavy construction equipment, such as front-end loaders, bulldozers, barges, trucks, backhoes, tractor trailers, cranes, small excavators, skid steers, fork lifts, asphalt machine, roller, small power tools, augers, pavement cutters, large jackhammers, generators, port-a-johns, a construction trailer, and a variety of power tools. Staging areas would be located on existing pavement or other heavily impacted areas. The first phase (after design) would be the demolition and removal of pavement, concrete pads, some or all of the boat ramps, the picnic tables, and restroom.

This project includes in-water work for the removal and rebuilding of a boat ramp and a floating pier. The overwater area of the amenities would be dependent upon final design, but for the purposes of this RP/EA, they are assumed to be approximately 3,900 square feet for the boat ramp, and 875 square feet for the floating pier. The floating pier will use an anchoring system every +/- 10 feet. The anchors will consist of chains or rods mounted on the dock and connected to square weights of concrete deadmen anchors. If during engineering and design, it is recommended that pilings be used, then no more than 12 in-water wooden or concrete piles with a 12-inch diameter or less are anticipated. If pilings are required, piling installation would use the least invasive techniques (e.g., jetting, pushing, or driving the piles) where possible, but could use impact hammers, given substrate and construction cost considerations. Substrate displacement for possible pilings would be less than 20 square feet. A minor amount of underwater excavation would be done to remove existing concrete boat ramps and to insert a temporary cofferdam, installed prior to demolition, so that the new concrete ramp can be installed. The exact method of construction is unknown at this time, and may involve the use of boats or barges. Construction equipment such as a backhoe with a long arm and bucket, located on shore near the mean

low tide line, may be used to remove and install materials. It is expected that a cofferdam method may be utilized to hold back water while concrete is placed. Depth of removal from the shallow benthos is approximately 0-3 ft., possibly deeper. Sand and material removed would be placed above the surf line where the concrete material would be removed and disposed of and sand returned back into the spot it came from as best as possible. During construction, BMPs and boom placement along with other avoidance and mitigation measures required by state and federal regulatory agencies would be employed to minimize any water quality and sedimentation impacts. NPS would continue coordination with resource agencies upon having additional construction method information.

Digging would also occur in the terrestrial environment for the boat ramp, parking lot, restrooms, picnic pavilion, lift station, boardwalks, fencing, and RV pads. There would be the following approximate areas of disturbed soils for each improvement: boat ramp (approximately 3,900 square feet, some in-water), parking lot (approximately 0.5 acres), restrooms (1,000 square feet), picnic pavilion (1,150 square feet), lift station (< 500 square feet), boardwalks (<350 square feet), fencing (marginal), and RV pads (<0.25 acres). Construction and digging activities, including staging areas for construction equipment, would utilize existing development footprints and disturbed areas where possible (e.g., existing parking lots), but digging and staging equipment could disturb some soils. The restrooms would use existing sewer and water connections, but additional ones may be necessary, but there would be minimal disturbance from this because the lines have already been extended to the former restroom. Although development of boardwalks and removal of parking areas would impact soils, ultimately, the boardwalks would concentrate foot traffic and reduce impacts to dune habitat and removed infrastructure would be revegetated, enhancing stability of soils.

Terrestrial work that may affect hydrology and water quality includes construction of additional impervious surfaces such as bathrooms, boat ramp, parking lots, and RV sites. Additional impervious surfaces could alter onsite stormwater run-off. In-water activities can temporarily impact water quality by increasing turbidity.

Specific mitigation measures would be implemented during construction to minimize erosion and overall soil impacts. Construction involving ground disturbances from proposed improvements and site preparation activities would have short-term minor and long-term adverse as well as long-term beneficial impacts on geology and substrates. This project would result in short-term minor as well as long-term adverse impacts on water quality and hydrology due to the potential construction of some impervious surfaces and site preparation activities. However, revegetation activities could have long-term benefits to water quality.

In summary, this alternative would have short-term and long-term minor adverse impacts and long-term beneficial impacts to physical resources.

Biological Resources

Construction activities in water and on land associated with this project could result in short-term impacts to aquatic habitat due to erosion and increased turbidity during construction. The release of sediments during in-water and terrestrial construction would be controlled using BMPs and mitigation

to protect aquatic habitat, prevent the transport of sediment into waterways, confine impacts to construction sites, and minimize the magnitude of the impacts on aquatic habitats.

In-water and terrestrial improvements would avoid wetlands to the extent practical and feasible and are subject to regulatory consultations depending on the final design. There are potential wetlands at the eastern end of the site, but no improvements are proposed for lands in or directly adjacent to wetlands. A 2015 Google Earth aerial image shows that dense SAV begins approximately 10 feet beyond the toe of the current ramp. As such, it is possible that the project could avoid directly impacting SAV beds, or indirectly affect it short-term from increased sediments in the water column. An analysis of SAV, likely via aerial imagery analysis and field survey, would be conducted prior to the start of construction. It is recommended that a pre- and post-boat ramp construction SAV survey be conducted between June 1 and September 30. If the post-construction SAV survey determines that there were unanticipated impacts resulting from demolition and construction of the ramp, then a functional assessment should be conducted to determine if appropriate in-kind mitigation should be developed and implemented.

Based on the in-water work for the boat ramp and pier, there are minimal anticipated effects to EFH resulting from the project. Specific conservation and mitigation measures would be implemented during the finalization of engineering and design plans and construction to minimize erosion and overall habitat impacts.

Construction equipment and staging areas could impact habitat, but as noted previously, these would be sited on existing development footprints, where possible, to minimize impacts. Although the improvements could potentially impact habitats and biological resources (e.g., clearing of vegetation, shoreline development), the boardwalks would concentrate human activity and reduce overall long-term impacts to the site and the revegetation activities would enhance habitats at the site. To mitigate potential impacts to the dune habitat from the construction of a boardwalk and trails, the Conservation Measures for Dune Walkover Construction (USFWS 2017) would be implemented during final design and construction.

The FL TIG would coordinate with the USFWS and review this project for impacts to bald eagles and migratory birds in accordance with the Bald and Golden Eagle Protection Act (BGEPA) of 1940 (16 U.S.C. §§ 668–668d) and the Migratory Bird Treaty Act of 1918 (MBTA) (16 U.S.C. §§ 703–712) to ensure that appropriate conservation measures and BMPs would be incorporated into the project. There are no bald eagles onsite, but standard BMPs would be implemented for migratory birds. To the extent possible, construction activities would avoid specific habitat locations onsite if there are known nesting birds and be conducted to outside of nesting seasons. Pre-construction nesting surveys for migratory birds and raptors would be conducted and if evidence of nesting is found, the FL TIG would coordinate with USFWS to develop and implement appropriate conservation measures. At a minimum, trees/shrubs with active nests would be flagged and avoided. To avoid or minimize impacts to migratory birds from increased human activity, trails would divert and concentrate recreational users away from any important nesting, foraging, or rookery locations including shorelines where previous social trails would be restored. Additionally, signage could be installed along boardwalks and the picnic pavilion to provide users information on sensitive species in the area and actions to take to avoid or minimize impacts to

sensitive species. Foraging and resting birds may temporarily be displaced during construction or recreation activities. Bird roosting would not be affected because construction activities and most human use would occur during daylight hours.

The FL TIG has begun coordinating with the relevant regulatory agencies related to potential impacts to protected species and habitats. Conservation measures recommended during formal consultation would be incorporated into final project design and implementation to avoid and/or minimize impacts to protected species and critical habitats. Specific conservation measures would also be implemented during construction to avoid and minimize disruption and overall impacts to protected species. Below is a list of potential protected species at the project site, effects from the project activities, and potential conservation measures.

Gulf sturgeon and critical habitat: There is critical habitat for Gulf sturgeon (Unit 12) in Choctawhatchee Bay, and sturgeon are known to be in the bay and along the Gulf of Mexico shoreline. Potential impacts to the Gulf sturgeon include elevated noise levels and the presence of suspended sediments in the water column due to construction-related activities Gulf sturgeon may be affected by the part of this project that occurs in the intertidal zone on the bay side. However, sturgeon are highly mobile and can avoid any disturbances in that area by swimming away. To mitigate potential affects to sturgeon and their critical habitat, standard BMPs such as those identified in the Sea Turtle and Smalltooth Sawfish Construction Conditions (NMFS 2006) and Gulf Sturgeon Mitigation Measures, would be followed. As a result of proposed construction activities proposed for the boat ramp and floating pier and anticipated recreational uses, this project component may have direct or indirect adverse effects on Gulf sturgeon and critical habitat. However, revegetation efforts could decrease stormwater runoff and subsequent declines in associated water quality impacts, could provide long-term beneficial effects on sturgeon critical habitat off of Okaloosa.

Sea turtles: The five sea turtle species have been observed within GUIS nesting, swimming, or feeding on the Gulf side of Santa Rosa Island or swimming or feeding on SAV on the bay side. Turtle nesting typically occurs on Gulf-side sandy beaches during the months of May through August, with hatching occurring from late July through October; it does not occur on the bay side where the project would be. There is potential for sea turtle encounters with private vessels using the boat ramp. The increase in boating activity and watercraft collisions with sea turtles in the bay, however, should be negligible. BMPs, such as those identified within the Sea Turtle and Smalltooth Sawfish Construction Conditions (NMFS 2006), would be implemented and adhered to during periods of in-water work. Additionally, BMPs within the Vessel Strike Avoidance Measures and Reporting for Mariners (NOAA 2008) would be implemented. With mitigation (BMPs), it is anticipated that the proposed action may affect, but is not likely to adversely affect, these sea turtle species.

Red knot and piping plover: There is suitable migration and wintering habitat present for these species on the shoreline of this site; these species are generally not present during the summer months (May-August). If construction occurs when the birds are present, noise and disturbance to resting and foraging birds may occur. However, by implementing mitigation measures (BMPs) these short-term construction impacts should be minimal. If disturbed while foraging during construction activities, these birds can

move to other suitable habitat to continue foraging and resting. Although this project would slightly increase the footprint of present facilities, it would be decreasing the impacts on beach habitat north of the parking lot by replacing 15-20 social trails with four boardwalks and trails and fencing off access to the old social trails. As such, this project is not expected to have any direct or indirect adverse effects on red knot and piping plover but may have long-term beneficial impacts on the species.

West Indian manatee and other marine mammals: The project location does not intersect with any identified critical habitat for the West Indian manatee. There is the Choctawhatchee Bay stock of bottlenose dolphins. Marine mammals are affected by vibrations and noise resulting from construction activities (e.g., generators, pile drivers, etc.). This project includes in-water work for the demolition and construction of the boat ramp and floating pier. If manatees are present, they would probably avoid the construction area. However, if manatees were spotted in the vicinity during construction, appropriate conservation measures would be undertaken to avoid adverse impacts associated with noise from construction activities. To avoid and minimize impacts the BMPs identified within the Sea Turtle and Smalltooth Sawfish Construction Conditions (NMFS 2006) and the Standard Manatee Conditions for In-Water Work (USFWS 2011) would be implemented and adhered to during periods of in-water work. As noted in these documents, these conditions require stopping operation of any equipment if manatees come within 50 feet of the equipment until the animals leave the project area of their own volition. As a result of construction related activities from the boat ramp and pier, this project may have direct and/or indirect short-term adverse effects on the West Indian manatee and other marine mammals.

Beach mice: While there are no protected species of beach mice at this site, the Santa Rosa beach mouse does inhabit the project location. Some improvements could disturb habitat, however, where creation and restoration of formalized trails would concentrate foot traffic, potentially benefiting the Santa Rosa beach mouse and its habitat. Standard BMPs for beach mice (as described in the PDARP/PEIS) would be implemented to avoid effects to the Santa Rosa beach mouse and its habitat.

Short-term as well as long-term adverse impacts to biological resources would occur onsite as a result of demolition and construction of improvements, construction activities, and site preparation activities. Long-term impacts associated with habitat and wildlife disturbance from visitors on the site are anticipated to be minor. Additionally, there would be long-term beneficial impacts to biological resources due to revegetation efforts, fencing and restoring former trails, and concentrating foot traffic on trails and boardwalks.

In summary, because construction activities would be localized to the site and habitat fragmentation would be limited, the project would have short- and long-term minor adverse impacts, and long-term beneficial impacts to biological resources. The project is not expected to have any significant adverse effects on floodplains.

Socioeconomic Resources

The Okaloosa Unit of GUIS has some existing infrastructure, including an entrance road, parking areas, restrooms, and shade structures. There are no designated protected view sheds in the vicinity of this project. During the construction phase of this project, construction equipment and operations would

likely be located in previously disturbed areas and parking lots. To the extent required, the use of construction equipment, including equipment used for the movement and placement of materials (i.e., barges) and barriers enacted to protect public safety would result in some minor to moderate short-term adverse impacts on aesthetics and visual quality. These impacts result from the presence of equipment, barriers and construction-related dust and emissions. During the construction period, visible impedances would detract from the natural landscape and create visual contrast for observers. Short-term closures of public areas may be required to accommodate construction activities, which could adversely affect visitors. From the public perspective, the site would be managed as it is at present, by NPS, and improvements should enhance visitor experiences at the park. This project would be expected to result in a short-term increase in construction jobs.

In summary, the project is anticipated to result in short-term minor adverse impacts to existing infrastructure and utilities, tourism and recreation, and aesthetics and visual resources. However, the project improvements would provide benefits and amenities to park visitors over the long-term.

4.4.2 FM6, St. Vincent National Wildlife Refuge Predator Control (Preferred)

The project restores habitat and ecological services through the removal of feral hogs and control of raccoon populations on federally managed lands at St. Vincent NWR that were injured by the DWH oil spill. The project would develop and implement management actions that enhance habitats and natural resources on St. Vincent NWR by addressing known causes of habitat degradation and/or mortality of threatened and endangered species and migratory birds. The project would be implemented by the DOI FL TIG Trustee and the USFWS Gulf Restoration Office in coordination with the St. Vincent NWR staff and the USDA Animal and Plant Health Inspection Service Wildlife Services (USDA-APHIS-WS). Specifically, the project activities would include:

- Eradicating or controlling the feral hog population by locating, trapping, and eliminating hogs, per the USDA-APHIS national *Integrated Feral Swine Damage Management Program* (USDA-APHIS 2015);
- Eradicating or controlling raccoon populations concurrent with hog control via trapping, shooting, or other means. Methods used by USDA-APHIS-WS and USFWS for the removal of raccoons follow the American Veterinary Medical (AVMA) Guidelines for the Euthanasia of Animals (AVMA 2013);
- Monitoring of evidence of presence of feral hog and raccoon.

Long-term benefits to the resources and services injured by the spill include reduced disturbance or mortality of endangered and threatened species, and restored habitat for fish and wildlife due to habitat enhancement. The project would be implemented working around sea turtle and shorebird nesting seasons and would be completed within approximately two years from the start date.

4.4.2.1 Resources Analyzed in Detail for this Alternative

Table 4-6 identifies how potentially affected resources are analyzed in this RP/EA for this alternative. In particular, it identifies whether resources were addressed in Section 4.2 (Resources Not Analyzed in Detail in this RP/EA), as well as resources that do not require additional analysis for this alternative

because they are unaffected by it, or the impacts would be so minor that a more detailed NEPA analysis is not needed. It also identifies resources that will be analyzed in detail.

Table 4-6 NEPA Assessment of Resources for this Alternative

Resource	Location of Analysis in Chapter 4
Physical Resources	
Geology and Substrates	Restoration activities for this alternative would not disturb geology or substrates in St. Vincent NWR because carcasses would not be buried on site. Raccoon carcasses would be left on the island or taken into the woods for scavengers, while feral hog carcasses would be left on the island or taken to specified locations in order to feed wolves.
Hydrology and Water Quality	Hydrology and water quality would not be affected by project activities. The use of poison is prohibited in feral hog and raccoon eradication in the NWR due to the presence of a breeding pair of red wolves. The restoration activities in this alternative do not involve any in-water work.
Air Quality and Greenhouse Gas Emissions	Section 4.2
Noise	Section 4.2
Biological Resources	
Habitats	Sections 4.4.2.2 and 4.4.2.3
Wildlife Species (including birds)	Sections 4.4.2.2 and 4.4.2.3
Marine and Estuarine Fauna (fish, shellfish, benthic organisms)	Restoration activities would not affect marine and estuarine fauna on the NWR because they do not involve in-water work or poison that could potentially pollute waters where marine and estuarine fauna live.
Protected Species	Sections 4.4.2.2 and 4.4.2.3
Socioeconomic Resources	
Socioeconomics	Sections 4.4.2.2 and 4.4.2.3
Environmental Justice	Section 4.2
Cultural Resources	Section 4.2
Infrastructure	Sections 4.4.2.2 and 4.4.2.3
Land and Marine Management	This alternative does not introduce changes in land and marine management because the NWR already actively controls the feral hog population with three annual public hunts as well as seasonal feral hog removal by NWR staff and the USDA-APHIS-WS (USFWS 2012). Eradication of feral hogs and control of the raccoon population align with activities already taking place on the NWR.
Tourism and Recreational Use	Sections 4.4.2.2 and 4.4.2.3
Fisheries and Aquaculture	Section 4.2
Marine Transportation	Section 4.2
Aesthetics and Visual Resources	Restoration activities would have minimal effects on aesthetics and visual resources. While temporary traps would be used to control raccoon populations, other methods of wildlife control such as shooting by qualified USDA-APHIS-WS and/or USFWS staff would not impact aesthetics on the NWR. Additionally, some feral hog removal activities would take place at night rather than during the day.
Public Health and Safety, Including Flood and Shoreline Protection	Section 4.2

Resource	Location of Analysis in Chapter 4
Note: Resource does not require additional analysis for this alternative because it is unaffected by the alternative, or the impacts would be so minor that a more detailed NEPA analysis is not needed.	

4.4.2.2 Affected Environment

The St. Vincent Island NWR Comprehensive Conservation Plan (CCP) (USFWS 2012) was used as the primary reference for the Affected Environment for the St. Vincent Island NWR Predator Control project and information was summarized from that document unless otherwise cited. St. Vincent NWR is a 12,490-acre refuge located in Franklin and Gulf counties along the Gulf Coast of Florida. St. Vincent NWR includes St. Vincent Island (12,358 acres), Pig Island (46 acres), a mainland tract (86 acres), and an office/visitor center in Apalachicola, Florida. The NWR additionally oversees 21 Farm Service Agency (FSA) easements. The majority of management activities occur on St. Vincent Island. Further details about the different areas of the St. Vincent NWR are provided below:

- *St. Vincent Island*: St. Vincent Island (12,358 acres) is located in Apalachicola Bay, in Franklin County, Florida. The island contains few developed areas and 21 different habitat types including upland slash pine, sand pine, scrub, hardwood hammocks, cabbage palm flatwoods, beach dunes, grasslands, marsh, and open water.
- *Pig Island*: Pig Island (46 acres) is located in Gulf County, Florida. Pig Island adjoins St. Joseph Bay and is separated from the St. Joseph Peninsula by the Pig Island Bayou. The undeveloped, low-lying island contains habitat such as sparse coniferous forest, freshwater marsh, flat sand terrain, bars, and pits.

Most of the key restoration activities, including eradication of feral hogs and control of the overabundant raccoon population, would occur on St. Vincent Island. Section II of the St. Vincent NWR CCP (USFWS 2012) details the affected environment for the NWR and describes in particular the physical, biological, and cultural resources that could be affected by the NWR management project. The CCP is incorporated by reference herein and summarized below.

Physical Resources

St. Vincent Island is one of four barrier islands associated with the Apalachicola River in the eastern panhandle. The NWR includes the entire island, a triangular-shaped, about 11,800 acres in size, and is about nine miles long and up to 4.5 miles wide. Parallel dune and ridge features that run generally east to west, are conspicuous features in aerial imagery of the island. Nineteen soil types are mapped for the NWR and range from well drained sands of the ridges, sand dunes, and uplands, to poorly drained mucks and soils of tidal and estuarine marshes and interdunal swales. Rainfall is the primary source of surface water on the island and water moves primarily via surface flow from uplands to creek channels. St. Vincent Island contains 583 acres of open water areas and 668 acres of palustrine marsh habitat in the form of lakes, bayous, and creeks.

About five percent of the surface water flows over large, flat areas several hundred feet wide through as sheet flow. Prior to becoming a NWR, St. Vincent Island's natural flow of surface water was altered by road and ditch construction that supported pine silviculture. These activities resulted in filled creeks,

drained wetlands, and water impounded upstream of roads. Five water-control structures between lakes on the southeastern portion of the island are also used to control flows Restoration of natural ridges and swales has restored much of the sheet flow on the island that was formerly impounded or diverted by roads. The water quality on St. Vincent NWR is related to the water quality in Apalachicola Bay, which is one of the most productive estuarine systems in the Northern hemisphere as a result of the overall good water quality. Therefore, the water quality on St. Vincent NWR is typically very good classified as Class II waters which have the most stringent bacteriological quality standards. Lastly, St. Vincent NWR is affected by the red tides that occur annually in the late summer or early fall in the Gulf of Mexico.

Further information about geology and substrates can be found in the Soils section in Section II of the CCP, and further information about hydrology and water quality can be found in the Hydrology and Water Quality and Quantity sections in Section II of the CCP (USFWS 2012).

Biological Resources

There is little development on the island and habitats are a mix of forest, scrub, wetland, interdunal swale, lacustrine, and beach dune habitats. The vegetation on St. Vincent NWR includes 21 cover classes, including xeric and maritime hammock, coastal grasslands and interdunal swales and lakes, salt marshes, coastal dune lakes, beach dunes, reefs, and managed marshes and open water, as well as some development. There are 33 plant species listed for the NWR that are considered invasive species to Florida. Nearly 600 plant species were documented as occurring on St. Vincent Island in the 1980s and additional surveys have increased that number. Additional information about habitats in St. Vincent NWR can be found in the Habitat section in Section II of the CCP (USFWS 2012).

St. Vincent NWR is home to a large variety of resident fish and wildlife species and provides resting, nesting, and foraging habitat for many migratory species. Currently, the NWR has documented 277 bird species, 40 fish species, 42 reptile species, 11 amphibian species, and 28 mammal species that have used the NWR. Federal and state listed species in the watershed are listed in Appendix E and federally listed species in the project area, as identified through USFWS IPaC, are listed in Table 4-7 (USFWS 2018a).

The common carp is the single exotic fish species on the NWR, but no exotic amphibian or reptile species have been found. Rock pigeon, Eurasian collared-dove, and European starling all breed on the NWR, but are thought to have minimal impacts on native wildlife. Coyotes occasionally disperse to the NWR and have the potential to negatively impact the red wolf island propagation program. USDA Wildlife Services provides predator control to remove coyotes observed on the NWR to benefit red wolf recovery. Feral cats have occasionally been documented on St. Vincent Island, especially in the vicinity of the cabin and near Indian Pass. Although free-ranging domestic cats can have devastating impacts on amphibian, reptile, bird, and mammal populations on the mainland, the impacts of these animals on overall NWR wildlife are considered relatively small on the NWR's island units.

Considered the most destructive exotic animal on the NWR, the feral hog can decimate marine turtle and seabird nests on the beach. Feral hogs may also prey on shorebird and gopher tortoise eggs and

young and were possibly the cause for the failure of the 1980 to 1982 eastern indigo snake reintroduction. Hogs prey upon small vertebrates and invertebrates and compete with native wildlife for mast. By rooting, hogs destroy wetland vegetation, including rare species, damage NWR roads and impoundments, and provide favorable conditions for the spread of invasive exotic plants. The three, annual, NWR public hunts provide some control of the feral hog population, but the hunting pressure is generally too low to be very effective. USDA-APHIS-WS provides some targeted seasonal removal of feral hogs in and near sensitive wildlife habitats (e.g., open Gulf beaches and secondary dunes). The NWR staff also conducts some seasonal feral hog removal to benefit gopher tortoise, marine turtle, and shorebird and seabird conservation and recovery.

There are multiple annual avian monitoring efforts on the NWR such as the USGS Breeding Bird Survey and the Audubon of Florida shorebird stewardship program. Additional information about wildlife, vegetation, and invasive species in St. Vincent NWR can be found in the Biological Resources section in Section II of the CCP (USFWS 2012).

Table 4-7 Federally listed species potentially occurring in the St. Vincent National Wildlife Refuge Predator Control project area

Common Name	Scientific Name	Habitat	Status	Likelihood
Gulf sturgeon	*Acipenser oxyrinchus desotoi*	Estuarine: various Marine: various habitats Riverine: alluvial and blackwater streams.	T	Likely
Eastern indigo snake	*Drymarchon corais couperi*	Terrestrial: mesic flatwoods, upland pine forest, sandhills, scrub, scrubby flatwoods, rockland hammock, ruderal.	T	Unlikely
Gopher tortoise	*Gopherus Polyphemus*	Terrestrial: sandhills, scrub, scrubby flatwoods, xeric hammocks, coastal strand, ruderal.	C	Unlikely
Green sea turtle	*Chelonia mydas*	Stays near the coastline and in bays near SAV habitats. They breed adjacent to the shoreline, and nest on sandy beaches.	T	Potentially
Hawksbill sea turtle	*Eretmochelys imbricata*	Forages around coral reefs; spends time in bays and estuaries. They breed adjacent to the shoreline, and nest on sandy beaches.	E	Potentially
Kemp's Ridley sea turtle	*Lepidochelys kempii*	Forage in sargassum and open waters. They breed adjacent to the shoreline, and nest on sandy beaches.	E	Unlikely
Leatherback sea turtle	*Dermochelys coriacea*	Forages in the open ocean waters. They breed in deep waters adjacent to the shoreline, and nest on sandy beaches.	E	Unlikely
Loggerhead sea turtle	*Caretta caretta*	Forages in the open ocean and shallow coastal waters. They breed adjacent to the shoreline, and nest on sandy beaches.	T	Potentially
Piping plover	*Charadrius melodus*	Estuarine: exposed unconsolidated substrate Marine: exposed unconsolidated substrate Terrestrial: dunes, sandy beaches, and inlet areas; mostly wintering and migrants.	T	Potentially
Red knot	*Calidris canutus rufa*	Estuarine: bays, tidal flats, salt marshes Terrestrial: sandy beaches Marine: aerial, near shore.	T	Likely

Common Name	Scientific Name	Habitat	Status	Likelihood
Wood stork	*Mycteria americana*	Estuarine: marshes Lacustrine: floodplain lakes, marshes (feeding); Palustrine: marshes, swamps, roadside ditches.	T	Likely
Red wolf	*Canis rufus*	Terrestrial: coastal prairie marshes, swamps, and agricultural fields.	E	Potentially
Note: Species determined to be "Unlikely" to be found in the action area are not addressed further in this analysis. E=Endangered, T=Threatened, SAT=Similarity of Appearance (Threatened), C=Candidate, SSC=Species of Special Concern, CH=Critical Habitat.				

Socioeconomic Resources

In contrast to GUIS, St. Vincent NWR has only one office and visitor center in Apalachicola, and offers hunting, fishing, and wildlife observation opportunities.

St. Vincent NWR is part of the 2,000-mile Great Florida Birding and Wildlife Trail developed by the FWC. The CCP notes the economic importance of wildlife viewing and birding in Florida, which generated approximately $3.1 billion from 2001-2006. Recreational activities on the NWR include hunting, fishing, and wildlife observation/photography. In addition to the three annual public feral hog hunts, there are a limited number of hunting permits for hunting with muzzleloading guns and archery equipment on the NWR, and there are five brackish/freshwater lakes on the NWR where fishing activities take place. Tourism is a contributor to the economy of the local area, with the "Leisure and Hospitality" industry accounting for 21.6 percent of employment in Franklin County and 9.7 percent of employment in Gulf County in 2009.

Very few systematic archaeological and historical investigations have been conducted on St. Vincent NWR. Since its establishment in 1968, most of the archaeological investigations and historic building assessments have been conducted primarily to ensure compliance with Section 106 of the National Historic Preservation Act. Exceptions include site condition assessments conducted by the NPS's Southeast Archaeological Center in May 2010, as part of the initial response following the DWH oil spill, an archaeological survey and testing of pre-Columbian sites along the island's northern shore, and geoarchaeological investigations to ascertain the barrier island's formation and sea level curves. A site monitoring program using volunteers and the NWR's Friends group was created as part of these investigations. At present, 25 historic properties have been recorded on the NWR. Twenty of these historic properties are pre-Columbian archaeological sites located along the barrier island's northern shore. The majority of these sites are eroding oyster shell middens. The three remaining historic properties are associated with mid-19th and early 20th century occupations on the island.

Additional information about tourism and recreation in St. Vincent NWR can be found in the Socioeconomic Environment and Refuge Administration and Management sections in Section II of the CCP, and information about cultural resources in the NWR can be found in the Cultural Resources section in Section II of the CCP (USFWS 2012).

4.4.2.3 Environmental Consequences

Restoration activities on the NWR are expected to primarily affect biological and socioeconomic resources, while impacts on physical resources would be negligible. Eradication of the feral hog population and control of the overabundant raccoon population on the NWR are predicted to have beneficial effects on habitats, wildlife species, and protected species due to decreased predation and habitat damage. The impact of project activities on tourism and recreational use is less clear due to the popularity of recreational feral hog hunting on the NWR; however, restoration activities would enhance other recreational activities in the long-term.

Only those resource areas for which potential impacts are expected are discussed in detail in this draft RP/EA. The FL TIG analyzed the following resources in more detail below:

- **Biological Resources:** Habitats, Wildlife Species, Protected Species
- **Socioeconomic Resources:** Socioeconomics, Tourism and Recreational Use, Infrastructure

Biological Resources

A major goal of restoration activities is to reduce habitat deterioration caused by feral hogs on St. Vincent Island (USFWS 2012). Feral hogs are responsible for extensive habitat damage and alteration in the NWR. Rooting behavior destroys wetland vegetation, including rare species, damages NWR roads and impoundments, and provides favorable conditions for the spread of invasive exotic plants (USFWS 2012). More generally, feral hog activities such as rooting, soil compaction, wallowing, and consuming seeds, seedlings, and roots ultimately result in the reduction of plant diversity and increased erosion. USDA-APHIS 2015).

Hence, the eradication of feral hogs would benefit habitats in the NWR because feral hogs would no longer threaten native plant diversity or create conditions that favor the growth of non-native invasive plants. After feral hogs are eradicated from a given area, further restoration activities may be required if invasive plants have colonized the area (USDA-APHIS 2015). While there is one documented case of increased native plant diversity in areas with feral hog damage, it was accompanied by an even greater increase in non-native plant diversity (USDA-APHIS 2015). In summary, the eradication of feral hogs on the NWR would be beneficial for both native plant diversity and invasive plant mitigation.

Restoration activities would, overall, have a beneficial impact on wildlife. Feral hogs compete with native wildlife for food, destroy habitat, prey on smaller native animals, destroy nests, consume reptile and bird eggs, and transmit diseases such as pseudorabies to other wildlife (USDA-APHIS 2015). Similar to feral hogs, raccoons are a significant cause of beach-nesting bird nest failure on St. Vincent Island (USFWS 2017). Raccoons are native to St. Vincent Island and activities carried out to control the overabundant raccoon population would have a negative impact on this native species.

The project activities could adversely impact non-target wildlife, but steps would be taken to mitigate these potential negative outcomes. Removal of animals by shooting is nearly 100 percent selective for target species (USDA-APHIS-WS, 2002) and would be carried out by authorized USDA-APHIS-WS and/or USFWS staff, so other wildlife would not be affected by this population management method. While there is a risk that non-target wildlife would be captured in traps meant for raccoons, the risk is greatly

reduced by using appropriate trap sizes and bait, selecting proper sites to set traps, and checking traps frequently (USDA-APHIS-WS 2002). Trapping would be carried out by a qualified USDA-APHIS-WS trapper two weeks per month per year, which would reduce the risk of trapping other wildlife on the NWR. Furthermore, restoration activities would not utilize chase hounds, toxicants, or visible lights on nesting beaches during turtle nesting seasons. Visible lights on nesting beaches at night could potentially discourage female sea turtles from nesting or disorient turtle hatchlings and prevent them from reaching the sea (USDA-APHIS-WS 2002); to avoid such consequences, night vision and Forward Looking Infrared Devices equipment would be used during nighttime feral hog or raccoon removal. Lastly, vehicle operators would follow Florida BMPs to minimize vehicle impacts on nesting beaches, which is especially relevant for migratory birds (USFWS 2017).

While there is the potential for restoration activities to have short-term, minor adverse impacts on wildlife due to accidental trapping or habitat disturbance, long-term benefits to shore birds and sea turtles are anticipated in the NWR. The proposed restoration activities would minimize known causes of habitat degradation and/or mortality of threatened and imperiled species and migratory birds and would help prevent overpopulation, reduce mortality of select species, and improve the natural diversity of resident wildlife on St. Vincent Island. These benefits, coupled with efforts to mitigate adverse effects to non-target wildlife populations, demonstrate the positive impacts that restoration activities would have on St. Vincent wildlife.

St. Vincent NWR nesting beaches have designated terrestrial critical habitat unit LOGG-T-FL-42 for nesting loggerhead sea turtle and FL-08 for wintering piping plover as well as the terrestrial critical habitat unit for the Gulf sturgeon, Unit 13. There would likely be no destruction of critical habitat as a result of this project. Enhancements to nesting loggerhead sea turtle and piping plover critical habitat units are expected as feral hogs and raccoons are removed.

We anticipate this management action would not adversely affect any listed species or designated critical habitat as BMPs (e.g., not using chase hounds, toxicants, or any visible lights on nesting beaches at night) would be utilized. Vehicle operators would avoid posted closed areas and would avoid driving on closed roads. Low tire pressure vehicle operators would follow standard well accepted Florida BMPs for operating four-wheel drive low tire pressure vehicles on nesting beaches (e.g., accessing the nesting beach only at designated access points or road intersections, operating at very low speeds (< 10 mph) close to the waterline, avoiding negatively impacting dune and beach vegetation, and avoiding the wrack line). The proposed restoration activities provide benefits to habitats and natural resources on St. Vincent NWR by addressing known causes of habitat degradation and/or mortality of threatened and imperiled species and migratory birds. In addition, management of overabundant native wildlife (e.g., raccoons) within the NWR boundary would help prevent overpopulation, reduce mortality of select species, and improve the natural diversity of resident wildlife on St. Vincent Island. We anticipate there would be no effects to marine turtles or marine mammals as a result of this project because the project does not include any in-water work.

The FL TIG has begun coordinating with the relevant regulatory agencies related to potential impacts to protected species and habitats.

In summary, the project could result in short-term minor adverse impacts on biological resources, but would have long-term benefits.

Socioeconomic Resources

The feral hog population on the NWR is controlled to some extent by three annual public hunts as well as seasonal feral hog removal by NWR staff and the USDA Wildlife Services (USFWS 2012). In total, the NWR hosts three permitted hunts: archery and primitive hunts for white-tailed deer, feral hogs, and raccoons, and a lottery primitive hunt for sambar deer which also includes feral hogs and raccoons (USFWS 2012). Eradicating feral hogs and controlling the raccoon population would decrease recreational hunting opportunities associated with these species. While a decrease in feral hog and raccoon hunting opportunities may disappoint some hunters, controlling or eradicating the populations of these species would actually have beneficial impacts on other hunting opportunities. The presence of feral hogs may adversely affect hunting opportunities of other species; for instance, feral hogs are known to prey on deer fawns (USDA-APHIS 2015) which may reduce white-tailed deer and sambar deer hunting opportunities. In addition to enhanced hunting of other game species, the eradication or control of feral hogs and raccoons has the potential to greatly enhance wildlife viewing opportunities (USDA-APHIS 2015) due to the positive effects that restoration activities would have on native wildlife in the NWR.

Feral hogs can cause damage to roads (USFWS 2012) and vehicle collisions with feral hog collisions are known to occur (USDA-APHIS 2015), so restoration activities would have a beneficial effect on NWR infrastructure.

In summary, this project is anticipated to result in long-term benefits to socioeconomic resources.

4.4.3 WQ2, Pensacola Beach Reclaimed Water System Expansion (Preferred)

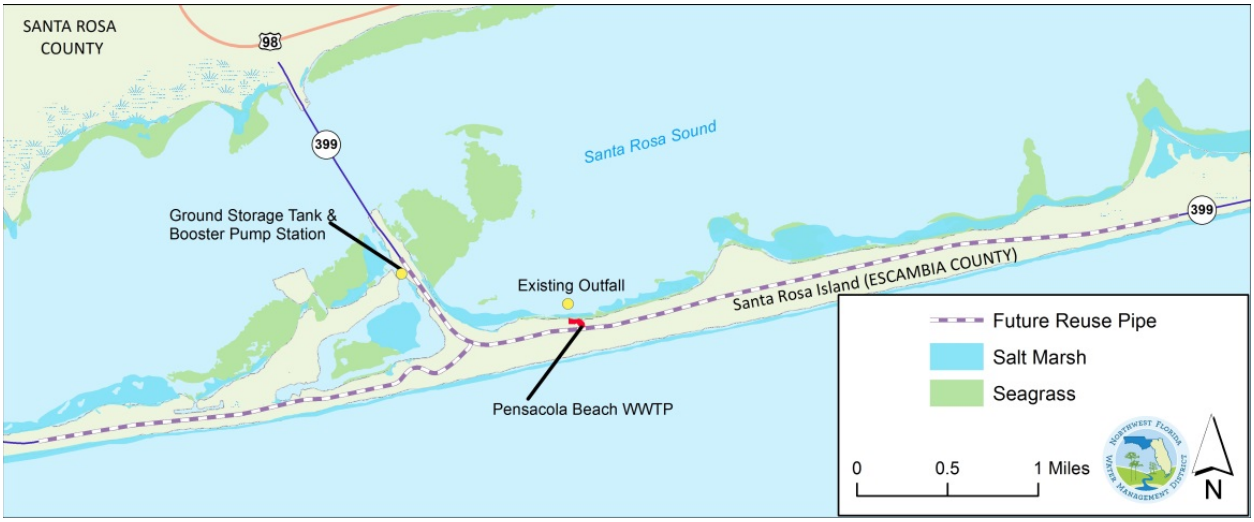
The project is an expansion of the ECUA Pensacola Beach Reclaimed Water System and includes construction of reuse pipelines along road ROWs in the community of Pensacola Beach, on Santa Rosa Island. Pumping facilities and reuse transmission and distribution lines would be constructed, consistent with Phase I-IV from ECUA's reclaimed water master plan (ECUA 2017). The project would reduce the discharge of nutrients and other pollutants into Santa Rosa Sound by expanding the ECUA's Pensacola Beach Reclaimed Water System by making additional reclaimed water from the ECUA advanced wastewater treatment (AWT) facility available to the Santa Rosa Island Authority for irrigation of additional public ROWs and for irrigation of individual properties in the commercial core and residential areas on Santa Rosa Island. Implementation of the full reclaimed water system (Phases I-V from Master Plan) represents the potential to reuse approximately 1.15 million gallons per day (MGD) instead of discharging it to Santa Rosa Sound, with 0.94 MGD made available through Phases I-IV.

4.4.3.1 Affected Environment

The project area includes the unincorporated community of Pensacola Beach on Santa Rosa Island in the Gulf of Mexico. Pensacola Beach is surrounded by residential and commercial areas to the west and east and Fort Pickens State Park and Eglin Air Force Base (AFB) make up the west and east ends, respectively, of the island. Santa Rosa Island is a barrier island separated from the mainland and the Fairpoint

Peninsula by the Santa Rosa Sound, with bridges connecting Pensacola Beach to Gulf Breeze, and then Gulf Breeze to the City of Pensacola.

Figure 4-3 Pensacola Beach Reclaimed Water System Expansion project location



Physical Resources

Santa Rosa Island is the largest barrier island within GUIS. Excessively drained sands characterize the project area, but greater than 99 percent of the project area is urbanized and exposed natural soils are limited to the beaches and dunes where development is not permitted. Urban Land Complex soil types makes up 84 percent of the project area, which are characteristic of dunes on barrier islands that have been developed. There are no hydric soils in the project area. In the project area, soils have been compacted and excavated for primarily residential, commercial, utilities, and transportation purposes. Groundwater is vulnerable to contamination due to the permeability of the sands combined with nonpoint source runoff from urban development. Water bodies on the island include surface waters (ponds) and subsurface waters (the water table), small interdunal wetlands, and Little Sabine Bay on the east side of the bridge to Gulf Breeze. The entire island is a designated Special Flood Hazard Area and also as a FEMA Zone V, i.e., is subject to hazards from storm waves.

Pensacola Bay and Santa Rosa Sound are designated as impaired for bacteria. Pensacola Beach is a geographic area of focus for wastewater treatment and management improvements (NWFWMD 2018). Water quality threats to the sound include nonpoint source pollution due to the increasing urbanization in the area and runoff from several neighboring golf courses.

ECUA provides water and wastewater treatment for residential and commercial water use on the island. The Pensacola Beach AWT facility currently averages 900,000 gallons per day (GPD) of effluent, with approximately 120,000 GPD of this used for irrigation along Via da Luna Drive right-of-way. The rest of the effluent, suitable for reuse, is discharged to a permitted outfall structure into Santa Rosa Sound. The FDEP operating permit for the wastewater treatment facility (WWTF) authorizes the reuse of the facility reclaimed water for public access reuse within the Santa Rosa Island franchise area and surface water

discharge to Santa Rosa Sound. AWT discharged presently undergoes disinfection and reductions of nutrients, suspended and dissolved solids, and organic materials.

Biological Resources

Santa Rosa Island has steep beaches on the Gulf side, while beaches on the Santa Rosa Sound side are wider and more gently sloping. Beaches are white quartz and in wider portions of the island, dunes and interdunal swales and ponds may be present, although wetlands make up less than one percent of the land cover in the project area (Table 4-8). Urban land uses and transportation make up more than 80 percent of the land cover in the project area and Little Lake Sabine accounts for another 15 percent. In addition, Environmental Sensitivity Index (ESI) maps prepared for Pensacola Bay (NOAA and FWC 2014) indicate beaches and salt and brackish marshes occur along the south side of Little Sabine Lake, while the shoreline on the east side of the Gulf Breeze bridge is characterized by tidal flats and beaches (NOAA and FWC 2017). However, natural vegetation is limited to scattered vegetation in dunes and SAV in Little Lake Sabine, and wetland and upland vegetation make up less than five percent of the project area.

Wildlife species in the highly urbanized project area are anticipated to include typical urban wildlife species include coyotes, fox, rodents, raccoons, opossums, armadillo, squirrels. Wading birds such as great blue herons and snowy egrets are common in stormwater ponds and swales. Frogs and reptiles such as snakes and turtles also inhabit roadside swales and water conveyances.

The list of federally threatened, endangered, proposed, candidate, and other species of concern for this site, as identified through USFWS IPaC and Florida Natural Areas Inventory (FNAI), is presented in Table 4-9 (USFWS 2018a). State and federally listed species for the watershed are provided in Appendix E. Terrestrial and marine species are unlikely to occur in the project area due to the urban development the project is intended to address, and the reclaimed water lines would be constructed in road ROWs However, habitats proximate to the project area include characteristic landform features of coastal barrier islands: beaches, coastal dunes, interior dunes, and low-lying beaches and marshes on the sound side of the island. The wide beaches on the Gulf side may support shorebirds, the Santa Rosa beach mouse, and sea turtles. Examples of habitat alteration include soil erosion, sedimentation of aquatic habitats, physical changes in topography, and wildfires. Habitat alteration can contribute to physical stress, injury, or mortality to wildlife and vegetation. Activities with potential consequences to habitats and wildlife in the Santa Rosa Island project area include vehicle and foot traffic. Analysis of potential noise impacts in this section focuses on biological resources and consists of identifying sensitive species and habitats within the Santa Rosa Island region of impact, analyzing the potential for impacts, and establishing management actions for the avoidance and/or minimization of identified potential impacts.

Table 4-8 Acres of habitat in the Pensacola Beach Reclaimed Water System Expansion project area

FLUCCS Code	Acres	Percent of Total Area
Developed - Total	**871.64**	**82.30**
Transportation, Communication and Utilities	**78.26**	**7.39**
8140: Roads and Highways	36.03	3.40

FLUCCS Code	Acres	Percent of Total Area
8180: Auto Parking Facilities	20.77	1.96
8330: Water Supply Plants	2.60	0.25
8340: Sewage Treatment	2.14	0.20
8370: Surface Water Collection Features	16.72	1.58
Urban and Built-Up	**786.30**	**74.24**
1110: Low Density, Fixed Single Family Units	3.69	0.35
1210: Medium Density, Fixed Single Family Units	380.60	35.94
1300: High Density, Fixed Single/Multiple Family Units	178.08	16.81
1400: Commercial and Services	84.02	7.93
1550: Other Light Industrial	15.22	1.44
1700: Institutional (Education, Religious, Health)	12.69	1.20
1800: Recreational Lands Including Swimming Areas, Fish Camps	109.05	10.30
1900: Open Land	2.95	0.28
Barren Land	**7.08**	**0.67**
7200: Sand Other Than Beaches	7.08	0.67
Undeveloped - Total	**187.42**	**17.70**
Rangeland	**13.62**	**1.29**
3220: Coastal Scrub	13.62	1.29
Water	**166.98**	**15.77**
5100: Streams and Waterways	4.00	0.38
5410: Embayments Opening Directly to Gulf of Mexico or Atlantic	162.98	15.39
Wetlands	**6.82**	**0.64**
6430: Wet Prairies	4.68	0.44
6460: Mixed Scrub-Shrub Wetland	2.14	0.20
Grand Total	**1,059.06**	**100.00**

Table 4-9 Federally listed species potentially occurring in the Pensacola Beach Reclaimed Water System Expansion project area

Common Name	Scientific Name	Habitat	Status	Likelihood
Florida perforate cladonia	*Cladonia perforata*	Terrestrial: sand/dune, shrubland/chaparral	E	Unlikely
Saltmarsh topminnow	*Fundulus jenkinsi*	Estuarine Habitat(s): Herbaceous wetland, Lagoon, Tidal flat/shore Palustrine Habitat(s): Herbaceous wetland	SSC	Unlikely
Reticulated flatwoods salamander	*Ambystoma bishopi*	Terrestrial: slash and longleaf pine flatwoods that have a wiregrass floor and scattered wetlands	E	Unlikely
Eastern Indigo snake	*Drymarchon corais couperi*	Estuarine: tidal swamp Palustrine: hydric hammock, wet flatwoods Terrestrial: mesic flatwoods, upland pine forest, sandhills, scrub, scrubby flatwoods, rockland hammock, ruderal	T	Unlikely
Piping plover	*Charadrius melodus*	Estuarine: exposed unconsolidated substrate Marine: exposed unconsolidated substrate Terrestrial: dunes, sandy beaches, and inlet areas; mostly wintering and migrants	T	Unlikely
Red knot	*Calidris canutus rufa*	Estuarine: bays, tidal flats, salt marshes Terrestrial: sandy beaches Marine: aerial, near shore	T	Unlikely
Red-cockaded woodpecker	*Picoides borealis*	Terrestrial: mature pine forests	E	Unlikely
Note: Species determined to be "Unlikely" to be found in the action area are not addressed further in this analysis. E=Endangered, T=Threatened, SAT=Similarity of Appearance (Threatened), C=Candidate, SSC=Species of Special Concern, CH=Critical Habitat.				

Socioeconomic Resources

The Project is located on Pensacola Beach on Santa Rosa Island. Santa Rosa Island is a barrier island, in the Gulf of Mexico separated from the mainland and the Fairpoint Peninsula by the Santa Rosa Sound. Bridges connect Pensacola Beach to Gulf Breeze, and then Gulf Breeze to the City of Pensacola. The project site is surrounded by residential and commercial areas to the west, Fort Pickens State Park and Eglin AFB make up the west and east ends, respectively, of the island.

Unincorporated Pensacola Beach includes a single census block on Santa Rosa Island. It has a reported population of 1,040 and median household income of $88,125 (vs. $46,117 for Escambia County). About 33 percent of the population (vs. 24 percent for Escambia County) has a bachelor's degree or higher. The population is 92.6 percent white, 2.6 percent Asian, 2.8 percent Hispanic, and 2.0 percent mixed race. Less than 4.0 percent (vs. 15.2 percent for Escambia County) of the population lives below the poverty level.

Santa Rosa Island is part of Escambia County. Escambia is demographically similar to the state of Florida as a whole, as shown in Appendix D. The percent of white individuals in Escambia County (69.4 percent) is lower than for the State of Florida and the U.S., both approximately 77 percent (U.S. Census Bureau 2018). Across all three geographic areas the percent of the population (aged 25 or older) with a high school education or higher is between 87 and 90 percent. The percent of the population (aged 16 or

older) in the labor force in Escambia County (56.9 percent) is similar to that of Florida (58.5 percent) and is lower than that of the U.S. as a whole (63.1 percent) (U.S. Census Bureau 2018). Following this trend, median household income ($46,117) is similar to Florida ($48,900) and lower than the U.S. ($55,322). With respect to poverty, the percent of the population living in poverty in Escambia County (15 percent) matches the typical rate in the State of Florida, and is higher than is typical in the U.S. (12.7 percent) (U.S. Census Bureau 2018).

The ECUA Advanced Wastewater Treatment facility (AWTF) is located on a parcel with the land use classification Sewage Treatment. It is owned by Emerald Coast Utilities Authority. The existing infrastructure on the AWTF includes the Santa Rosa Island Authority Maintenance offices and the Pensacola Beach AWTF, which are adjacent to the Santa Rosa Sound beach area. The majority of the reclaimed water lines to be constructed would occur on parcels with a land use classification of Roads and Highways.

4.4.3.2 Environmental Consequences

Only those resource areas for which potential impacts are expected are discussed in detail in for this alternative. The FL TIG analyzed the following resources in more detail below:

- **Physical Resources:** Geology and Substrates, Hydrology and Water Quality
- **Biological Resources:** Habitats, Wildlife Species, Marine and Estuarine Fauna, Protected Species
- **Socioeconomic Resources:** Socioeconomics, Tourism and Recreational Use, Aesthetics and Visual Resources, Land and Marine Management

Physical Resources

The Proposed Action has the potential to impact water resources within and around the project area due to sedimentation and/or contamination related to testing and construction activities. The project would include installation of approximately 11.5 miles of PVC pipe ranging from 2 inches to 12 inches in diameter, in existing rights-of-way, to distribute reuse water to ECUA commercial and residential water users.

Approximately 0.12 MGD of the effluent from the Pensacola Beach WWTF is currently diverted (pumped) to a reuse system that has a capacity of 0.132 MGD. Expansion of the existing reuse system would allow ECUA to reuse more water, reduce the potable water demand for irrigation on Pensacola Beach, and reduce or potentially eliminate the remaining point source discharge into Santa Rosa Sound. The flows at the WWTF vary greatly with the seasons with winter flows averaging 600,000 GPD and summer flows around 1,200,000 GPD. Variation in seasonal demand for reuse water would have little to no impact on sizing of water mains buried along roads and rights-of-way. The project does not include water connections to residential users. Businesses currently operating under a NWFWMD Consumptive Use Permit for well water could be mandated to utilize reclaimed water once it is available but that has not been determined.

Benefits of this project include reduced nutrient loading to Santa Rosa Sound and conservation of potable water and reduced demand on the Sand-and-Gravel aquifer, ECUA's drinking water source. Implementation of this project would result in the potential to reuse approximately 0.94 mgd instead of

discharging it to Santa Rosa Sound—thus, combining current reuse amounts, total nitrogen loadings avoided would be up to approximately 8,500 pounds, total phosphorus up to about 2,850 pounds, and total suspended solids up to about 14,000 pounds per year at current permitted discharge limits. In terms of potential potable water saved per year, full implementation of the reclaimed water system would increase the potential potable water saved per year to about 1,200 acre-feet. Fertilizer use may be reduced because of the nutrients in the reuse water that would be used for irrigation. Mitigating hydrologic and water quality degradation in coastal watersheds along the Florida coast would reduce the occurrence of chronic threats to coastal and nearshore habitats and provide improved recreational use opportunities. Additionally, water quality improvements benefit the overall health and resiliency of the Gulf ecosystem by restoring integral estuarine habitats and the resources that depend on them.

No significant impacts to soils are expected. Ground testing and surveys may impact dune vegetation, induce erosion, displace sand, cause temporary changes to beach contours, and cause compaction and rutting. Construction of the reclaimed water lines and pumping station would occur in road ROWs or already disturbed areas. However, avoidance of the primary dune line and dunes over five feet in height, and monitoring/management practices would decrease such potential. Compaction, rutting, and changes in contours would be temporary.

No significant adverse impacts to water resources are expected. Increased turbidity and erosion would be expected during construction, although road construction BMPs would be implemented and long-term adverse impacts are not anticipated. During construction, BMPs and required stormwater and erosion control measures would be implemented to avoid adverse impacts to drainage basins, floodplains, surface waters, or ground water resources. An NPDES stormwater construction permit would be obtained prior to construction activities and permit requirements would be implemented accordingly. Wetland mitigation needs would be assessed during the Florida Environmental Resource Permit, USACE Section 404 Permit, and the Application for Works in the Waters of Florida processes. Construction and stormwater permits would include an Erosion, Sedimentation, and Pollution Control Plan which would require the implementation of site-specific management actions and BMPs, such as planting vegetation, employing silt fencing, sand bags, rock bags, sediment traps, sediment basins, synthetic bales, and floating and staked turbidity barriers. These measures would help ensure that right-of-way construction activities do not create erosion, sedimentation, or siltation that would negatively impact individual species and their habitat.

In summary, this alternative would have short-term and long-term minor adverse impacts and long-term beneficial impacts to physical resources.

Biological Resources

The project area is almost completely urbanized. Fish and wildlife, including listed species, are not anticipated to remain in the project area once construction begins. Construction is not anticipated to occur in the dunes or along beaches, thereby eliminating potential impacts to nesting sea turtles or shorebirds. Impacts to roadside swales and ditches during construction would be expected to result in short-term, temporary, adverse impacts to associated habitat and fish and wildlife. Other physical impacts to habitats to wildlife or flora would occur due to construction vehicle collision/foot trampling,

although mobile species would generally be able avoid contact. Sensitive habitats proximate to the project area include dune communities, sea turtle nesting habitat, sea bird and shorebird nesting and foraging areas (including piping plover critical habitat), EFH, and Gulf sturgeon habitat. Secondary impacts would be avoided by not using artificial lighting of sensitive areas at night.

The FL TIG has begun coordinating with the relevant regulatory agencies related to potential impacts to protected species and habitats.

In summary, the project could result in short-term, temporary, adverse impacts to biological resources, but impacts would not be significant and are not likely to adversely affect sensitive species and their habitats.

Socioeconomic Resources

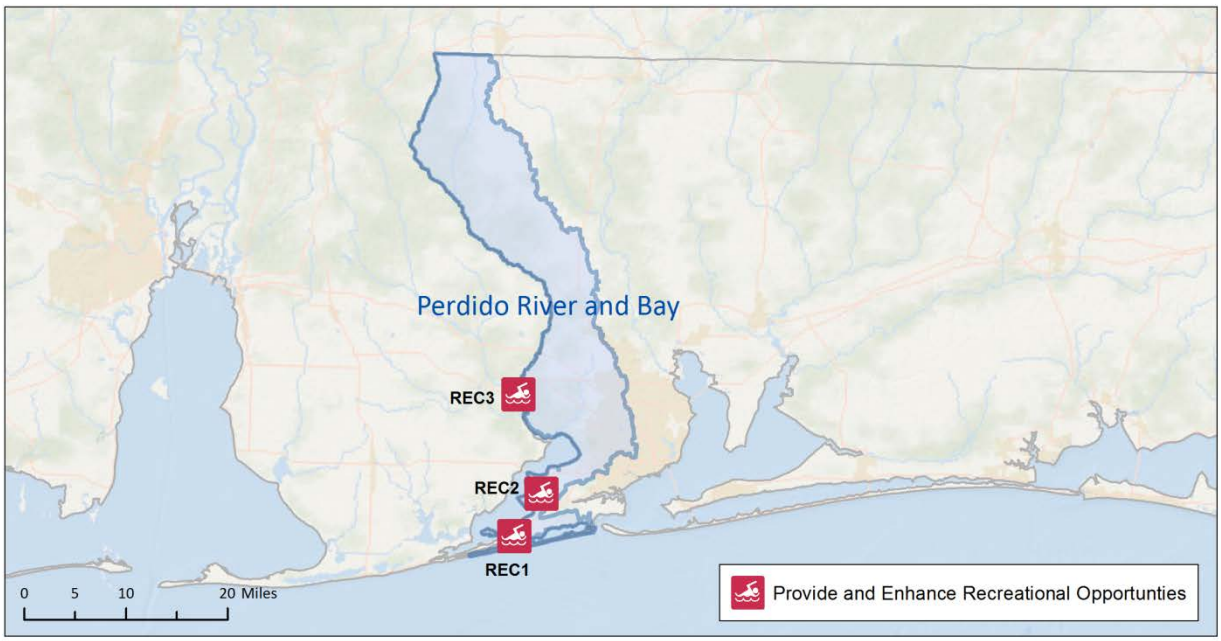
The project would be expected to result in short -increase in construction jobs. During the construction phase of this project, construction equipment and operations would likely be located along in previously disturbed areas and parking lots. The use of construction equipment, including equipment used for the movement and placement of materials (i.e., barges) and barriers enacted to protect public safety would result in some minor to moderate short-term adverse impacts on aesthetics and visual quality. These impacts result from the presence of equipment, barriers and construction-related dust and emissions. During the construction period, visible impedances would detract from the natural landscape and create visual contrast for observers. Short-term closures of public areas may be required to accommodate construction activities, which could adversely affect visitors.

The project, which would improve water quality and increase the access to reclaimed water for irrigation for commercial and residential use, would provide economic benefit to local homes and businesses by reducing the use of potable water for landscape irrigation.

In summary, this project is anticipated to result in short-term minor to moderate adverse impacts and long-term benefits to socioeconomic resources.

4.5 Perdido River and Bay Watershed

Figure 4-4 Projects in the Perdido River and Bay Watershed



As shown in Figure 4-4, three projects are located in the Perdido River and Bay watershed:

- REC1, Perdido Bay Sunset Islands Snorkeling Trail;
- REC2, Tarkiln Bayou Preserve State Park Improvements; and
- REC3, Perdido River and Bay Paddle Trail.

4.5.1 Area Overview

The Perdido River and Bay watershed includes approximate 750 square miles in southern Alabama and an additional 350 square miles of northwest Florida, part of which extends into the Pensacola metropolitan area. The watershed is the westernmost watershed in Florida and the Perdido River forms the Florida boundary with Alabama. The Perdido River and Bay SWIM Plan (NWFWMD 2017a) reports that the ecology of Perdido Bay has been affected by long-term point source and nonpoint source

pollution, declines in SAV, nutrient enrichment in bay sediments, as well as exposure to crude oil and weathered residue from the DWH oil spill. The SWIM plan also identifies water quality, wetlands, estuarine and coastal habitats, riverine and stream habitats, and floodplains as management priorities in the watershed. The information presented here is summarized from the SWIM plan unless otherwise noted.

The surface geology of the Florida panhandle is made up of three different types of sediment: limestones, organics, and clastics (silt, clay, sand, gravel). The northern half of the panhandle is dominated by sandy clays or clayey sands deposited by the alluvial action of rivers and streams. The southern half, especially in the western panhandle, is dominated by sands deposited along ancient shorelines. The eastern half of the Panhandle is influenced by the presence of limestone near the surface which has resulted in various types of underground solution activity, such as sinkhole and cave formation. In low lying areas (stream courses or natural depressions of varying kinds), especially south of the Cody Scarp (where the highlands drop rather abruptly into the coastal lowlands) and east of the Choctawhatchee River, soils may include organic peat, muck, and other types of decomposing plant litter rather than sands.

4.5.1.1 Physical Resources

The Perdido River begins in Baldwin County, Alabama, and flows approximately 65 miles to Perdido Bay, with an estimated average annual flow of 767 cubic feet per second (cfs). Several rivers and creeks in Alabama and Florida join the Perdido River (e.g., the Blackwater River), or discharge directly into the bay, such as Eightmile Creek. Perdido Bay estuarine waters include Tarkiln and Weekly Bayou, as well as Garcon and Marcus bayous.

Perdido River is designated a OFW and waters throughout the watershed are classified by the state as Class III (designated for recreation and maintenance of a healthy, well-balanced population of fish and wildlife). Surface water quality along the river and tributaries reflects nonpoint source pollution from across the landscape (highways, dirt roads, buildings, farms, forestry operations, construction sites, that delivers pollutants (such as nutrients, microbial pathogens, sediment, petroleum products, metals, pesticides, and other contaminants) into receiving waters. Construction activities, unpaved roads, abandoned clay pits, and agricultural and silvicultural practices without proper implementation of BMPs are common sources of sedimentation and erosion in the watershed. Sediment from runoff can accumulate and bury SAV and other benthic habitats such as shellfish beds, reduce water clarity, and alter flows and storage capacity of waterbodies, potentially increasing flooding, impeding navigation, and requiring dredging. Paving graded dirt roads that are a source of sediment into streams and stormwater drainage systems (TNC 2014) can reduce sediment runoff.

Of the 72 waterbody segments in the Perdido River and Bay, FDEP has identified 27 as impaired, including: 22 for mercury in fish tissue, six for bacteria (five for fecal coliforms and one for beach advisories), one for turbidity, and three for dissolved oxygen (DO). TMDLs have been adopted by the FDEP for fecal coliform in the lower Perdido River and Bay watershed for Brushy Creek, Elevenmile Creek, and Tenmile Creek (FDEP 2016a) and there is a statewide TMDL for reducing human health risks associated with consuming fish taken from waters impaired for mercury. Proposed alternatives in this

RP/EA are located in areas impaired for bacteria and turbidity (WBID 542) and bacteria (462B) along the lower Perdido River. Permitted domestic and industrial wastewater facilities, hazardous waste facilities, petroleum contaminated sites, and Superfund sites in the watershed are primarily in the southern half of the watershed where industrial land uses are located. The sand and gravel aquifer, which is the primary source of potable water in the watershed, is most vulnerable to contamination from runoff or discharges along the coast. The Perdido River and Bay watershed has two hazardous waste that manage hazardous waste and report to EPA every two years, both in the Pensacola metropolitan area, in addition to 182 active petroleum contamination tracking sites. One large scale mining operation is active in the watershed. Consequently, surface and ground water resources are potentially vulnerable to contamination.

Water quality priorities in the watershed include: water quality impairments in urban bayous and streams, Big Lagoon, Perdido River; improved wastewater treatment; legacy pollutants; onsite sewage treatment and disposal systems (OSTDS); and sedimentation from unpaved roads and other erosion sources. In summary, this alternative would have short-term and long-term adverse minor impacts and long-term beneficial impacts to physical resources.

4.5.1.2 Biological Resources

The Perdido River, Perdido Bay, and contributing tributaries and corresponding wetlands, floodplains, bayous, embayments, and other water and related resources support fish and wildlife habitat and recreation activities. Biological resources are concentrated in natural areas outside of the developed urban and agriculture portions of the watershed. Wetlands and floodplains are most extensive along the river and upland forests occur throughout the watershed, separated by the river corridors and wetlands. Floodplain and wetlands characterize the length of the Perdido River and its tributaries. Major wetland systems occur along the north shore of Perdido Bay, Garcon Swamp and Bayou Garcon, and Tarkiln Bayou. Palustrine and tidal wetlands in Tarkiln Bayou and portions of Big Lagoon are an important link between the riverine aquatic and terrestrial habitats, providing permanent and seasonal habitat for breeding, foraging, and migration of many species. Much of the lower Perdido River and Bay watershed is within the Federal Emergency Management Agency (FEMA)-designated 100-year floodplain with a designation of Zone A.

Habitats supporting marine and estuarine wildlife in the watershed include ocean bottom habitats such as sand or mud, hard substrate habitats, reefs, and SAV communities. Florida Natural Areas Inventory (FNAI) lists 18 federally listed species in the watershed in habitats ranging from upland sand pine scrub to Gulf beaches. The mainland portion of the watershed includes designated critical habitat for the threatened Gulf sturgeon. EFH habitats in the Perdido River and Bay watershed include estuarine emergent wetlands, SAV beds, algal flats, mud, sand, shell, and rock substrates, and the estuarine water column. Proposed alternatives provide provides habitat for prey species. EFH is designated in coastal waters of the watershed for red drum, reef fish (e.g., red snapper, coastal migratory pelagics (e.g., mackerels, and all four shrimp species (white, pink, and brown *Penaeus* spp. and royal red shrimp (*Pleoticus* spp.)). Bottlenose dolphins are found in shallower waters along the Gulf coast and are protected under the MMPA, including those reported in Perdido Bay.

Natural systems priorities in the watershed include: altered riparian habitats; altered hydrology; vulnerability of estuarine and coastal habitats due to legacy pollutants, shoreline erosion, saltwater intrusion, and sea level rise; and altered and impacted tributary streams, sediment deposition, and streambank erosion.

4.5.1.3 Socioeconomic Resources

Much of Perdido River and Bay is in Escambia County. Escambia County had a total population of 313,512 people, an increase of 5.3 percent since 2010, based on the 2017 U.S. Census. Escambia is demographically similar to the state of Florida as a whole, as shown in Appendix D. The percent of white individuals in Escambia County (69.4 percent) is lower than for the State of Florida and the U.S., both approximately 77 percent (U.S. Census Bureau 2018). The percent of the population (aged 16 or older) in the labor force in Escambia County (56.9 percent) is similar to that of Florida (58.5 percent) and lower than that for the U.S. (63.1 percent) (U.S. Census Bureau 2018). Following this trend, median household income ($46,117) is similar to Florida ($48,900) and lower than the U.S. as a whole ($55,322). With respect to poverty, the percent of the population living in poverty in Escambia County (15 percent) matches the State of Florida, and higher than is typical in the U.S. (12.7 percent) (U.S. Census Bureau 2018).

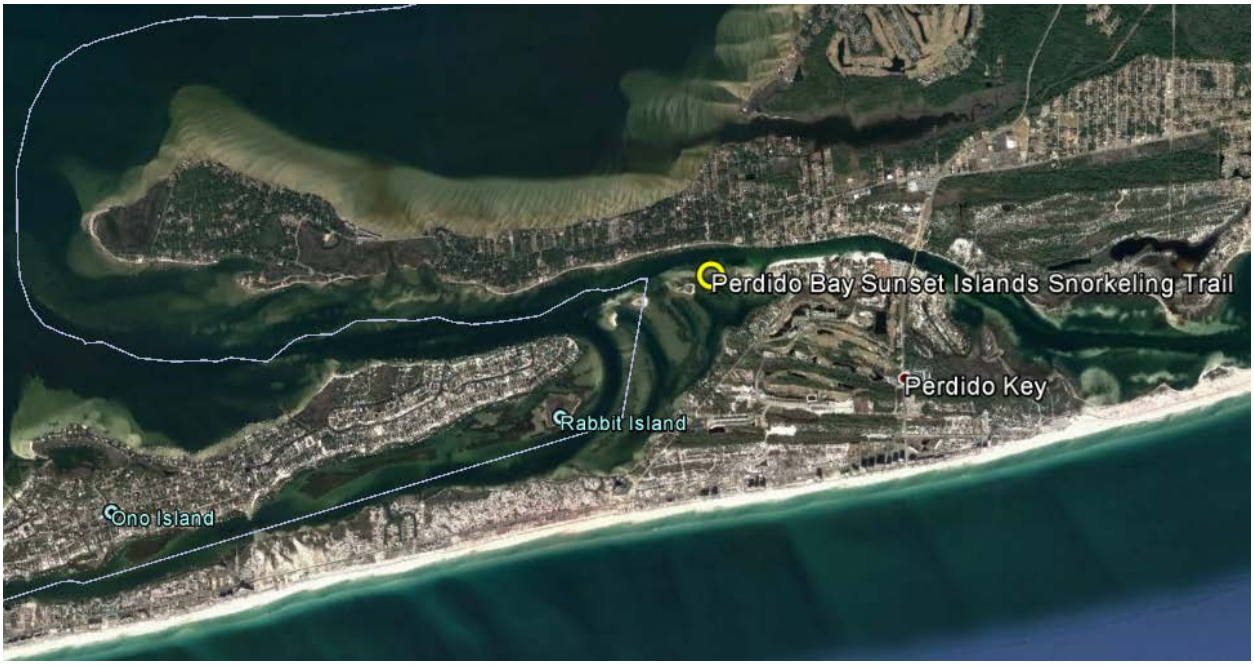
4.5.2 REC1, Perdido Bay Sunset Islands Snorkeling Trail

This project would occur in-water to the east of Point Ono on Ono Island (west of Holiday Harbor, and north of Perdido Key) in Perdido Bay near Old River in Escambia County, Florida (Figure 4-5). Specifically, this project would include:

- Construction of a breakwater; and
- Establishment of an underwater snorkeling trail with educational signage.

These additions would enhance the public's access to the surrounding natural resources and enhance recreational experiences. The action area for the project does not include any terrestrial improvements. Additional details on the project are provided in Chapter 2 (Section 2.5.4).

Figure 4-5 Perdido Bay Sunset Islands Snorkeling Trail Location



4.5.2.1 Affected Environment

Physical Resources

The project is within the Coastal Lowlands physiographic region, being characterized as a flat area with old dune ridges. The site is located within Perdido Bay, where it meets with Old River near Perdido Key and Ono Island. Soil in the area has been classified by the USDA-NRCS for the surrounding islands as urban lands with underlying sand. The soils in the action area would be sediment (likely sandy sediment) as the improvements take place in-water. The Perdido River has its headwaters in southern Alabama and discharges to Perdido Bay. In its lower reaches, the river is a tannin-stained blackwater stream, and the upper portion of the river is a shifting sand river system. The Perdido River has been designated as an OFW. The action area, while being underwater, is still located in FEMA Flood Zone AE with a flood elevation of five feet (FEMA 2018).

Biological Resources

All improvements are proposed in-water. Based on available information, there is SAV habitat in and around the action area and along the shoreline of two small sand islands, specifically *Halodule wrightii* (Google Maps 2018; NOAA OR&R, UNH, and USEPA 2018). No existing infrastructure is located on the site. The project area and adjacent areas include estuarine and marine wetlands and deepwater habitats (USFWS 2018b). EFH for coastal migratory pelagics, stone crabs, reed fish, shrimp, and red drum is present in the Perdido Bay and action area (NOAA OR&R, UNH, and USEPA 2018).

Fish and wildlife potentially present in and around the site include migratory birds and select aquatic and terrestrial protected species. Migratory birds could potentially use this site for resting and foraging. Potential migratory bird groups include wading birds (e.g., rails, scoters), shorebirds (e.g., tern,

skimmers, gulls), raptors (e.g., kestrels, eagles, kites), and songbirds (e.g., warblers). However, due to the nature of the site being in-water, species would use the site for limited activities and it is unlikely that raptors or songbirds would be in and around the action area. It is unlikely that bald eagles would be present in and around this site.

The list of federally threatened, endangered, proposed, candidate, and other species of concern for this site, as identified through USFWS IPaC, is presented in Table 4-10 (USFWS 2018a). There is no critical habitat in the project area. A list of all state and federally listed species found in this watershed is presented in Appendix E.

Table 4-10 Federally listed species potentially occurring in the Perdido Bay Sunset Islands Snorkeling Trail project area

Common Name	Scientific Name	Habitat	Status	Likelihood
Gulf sturgeon	*Acipenser oxyrinchus desotoi*	Estuarine: various Marine: various habitats Riverine: alluvial and blackwater streams.	T	Potentially
Piping plover	*Charadrius melodus*	Estuarine: exposed unconsolidated substrate Marine: exposed unconsolidated substrate Terrestrial: dunes, sandy beaches, and inlet areas; mostly wintering and migrants.	T	Potentially
Red knot	*Calidris canutus rufa*	Estuarine: bays, tidal flats, salt marshes Terrestrial: sandy beaches Marine: aerial, near shore.	T	Potentially
Green sea turtle	*Chelonia mydas*	Stays near the coastline and in bays near SAV habitats. They breed adjacent to the shoreline, and nest on sandy beaches.	T	Potentially
Hawksbill sea turtle	*Eretmochelys imbricata*	Forages around coral reefs; spends time in bays and estuaries. They breed adjacent to the shoreline, and nest on sandy beaches.	E	Potentially
Kemp's Ridley sea turtle	*Lepidochelys kempii*	Forage in sargassum and open waters. They breed adjacent to the shoreline, and nest on sandy beaches.	E	Potentially
Leatherback sea turtle	*Dermochelys coriacea*	Forages in the open ocean waters. They breed in deep waters adjacent to the shoreline, and nest on sandy beaches.	E	Potentially
Loggerhead sea turtle	*Caretta caretta*	Forages in the open ocean and shallow coastal waters. They breed adjacent to the shoreline, and nest on sandy beaches.	T	Potentially
West Indian manatee	*Trichechus manatus*	Estuarine: SAV, open water Marine: open water, SAV.	T	Potentially
Note: Species determined to be "Unlikely" to be found in the action area are not addressed further in this analysis. E=Endangered, T=Threatened, SAT=Similarity of Appearance (Threatened), C=Candidate, SSC=Species of Special Concern, CH=Critical Habitat.				

Socioeconomic Resources

The project site is in the Perdido Bay, adjacent to the Intracoastal Waterway. It includes two existing undeveloped islands surrounded by SAV with no existing infrastructure. There are no designated protected view sheds in the vicinity of this project.

4.5.2.2 Environmental Consequences

Only those resource areas for which potential impacts are expected are discussed in detail in for this alternative. The FL TIG analyzed the following resources in more detail below:

- **Physical Resources** – Geology and Substrates, Hydrology and Water Quality
- **Biological Resources** – Habitats, Wildlife Species, Marine and Estuarine Fauna, Protected Species
- **Socioeconomic Resources** – Socioeconomics, Land and Marine Management, Tourism and Recreational Use, Aesthetics and Visual Resources.

Physical Resources

This project exclusively includes in-water work for the construction of a breakwater and snorkeling trail. There would be no overwater area for any of the proposed improvements, but there would be digging and sediment displacement from the construction of the breakwater and sediment displacement from the installation of markers and signage for the snorkeling trail. The action area is subject to final design, but for the purposes of this RP/EA, the breakwater would likely cover an area < 1 acre and the snorkeling trail would likely cover an area < 1 acre (with substrate displacement occurring in < 150 square feet). During construction, BMPs and boom placement along with other avoidance and mitigation measures required by state and federal regulatory agencies would be employed to minimize any water quality and sedimentation impacts.

As a result of the proposed improvements, there may be increased suspended sediment in the water column during construction in the short-term. Additional increases and disturbance of sediments would occur in the long-term from recreational users of the snorkeling trail. While the breakwater would remove sediment, it would also prevent erosion from nearby islands in the long-term.

Specific mitigation measures would be implemented during construction to minimize erosion and overall soil and water quality impacts. Construction involving ground disturbances from proposed improvements and site preparation activities would have short-term minor and long-term adverse impacts on geology and substrates. A site-specific erosion and sediment control plan will be developed to minimize the impacts to water quality. This project would result in short-term minor as well as long-term adverse impacts on water quality and hydrology due to the construction of the breakwater and snorkeling trail and use of the snorkeling trail. The breakwater would have long-term beneficial impacts on soils from reducing erosion.

In summary, the project would have short-term and long-term minor adverse impacts and some long-term beneficial impacts to physical resources.

Biological Resources

Construction activities associated with this project could result in short-term impacts to aquatic habitat due to removal of sediments and increased suspended sediments in the water column. The release of sediments would be controlled using BMPs and mitigation to protect aquatic habitat, prevent the transport of sediment (where possible), confine impacts to construction sites, and minimize the magnitude of the impacts on water quality in Perdido Bay and Old River. Any work in waters of the U.S.,

including wetlands, associated with this alternative would be coordinated with the USACE pursuant to the CWA Section 404 and RHA. Coordination with the USACE and final authorization pursuant to CWA/RHA would be completed prior to final design and construction (USACE and NMFS 2001).

In-water improvements would avoid wetlands to the extent practical and feasible and are subject to regulatory consultations depending on the final design. An analysis of SAV, via aerial imagery analysis and field survey, would be conducted prior to the start of construction (between June 1 and September 30). Based on the breakwater construction, installation of signs for the snorkeling trail, and increased recreational use in the waters in and around SAV and EFH, there are minor anticipated effects to SAV and EFH resulting from the project. Construction equipment and staging areas could impact habitat. Staging areas would likely be on developed areas on Perdido Key or the mainland, as well as barges. Barges and any vessels used during construction would be staged outside SAV habitat. Specific conservation and mitigation measures would be implemented during the finalization of engineering and design plans and construction to minimize erosion and overall habitat impacts.

The FL TIG would coordinate with the USFWS and review this project for impacts to bald eagles and migratory birds in accordance with the Bald and Golden Eagle Protection Act (BGEPA) of 1940 (16 U.S.C. §§ 668–668d) and the Migratory Bird Treaty Act of 1918 (MBTA) (16 U.S.C. §§ 703–712) to ensure that appropriate conservation measures and BMPs would be incorporated into the project. There are no bald eagles anticipated to be in the action area, but standard BMPs would be implemented for migratory birds. To the extent possible, construction activities would avoid specific habitat locations onsite if there are known foraging birds. Foraging and resting birds may temporarily be displaced during construction or recreation activities, but due to the nature of the improvements, any birds using the site for resting or foraging would avoid the action area during construction or recreational use. All construction activities and use of the site after construction would occur during daylight hours.

The FL TIG would coordinate and complete consultation with relevant regulatory agencies, if necessary, on this project regarding potential impacts to protected species and habitats prior to project implementation. Surveys would be completed to determine if protected species are present at the site. If protected species were present, conservation measures recommended during consultation would be incorporated into final project design and implementation to avoid or minimize impacts to protected species and critical habitats. Specific conservation measures would also be implemented during construction to avoid or minimize disruption and overall impacts to protected species. Below is a list of potential protected species at the site, effects from the project activities, and potential conservation measures.

Gulf sturgeon: While there is the potential for sturgeon to be in the waters during the time of construction or during recreational use, it is unlikely. Sturgeon have only recently been found in Perdido Bay; however, they are found in Pensacola Bay, which is hydrologically connected to Perdido Bay. Additionally, there is critical habitat in Big Lagoon, which is directly east of the action area. Potential impacts include elevated noise levels and the presence of suspended sediments in the water column due to construction and recreational use related activities. This species is mobile and would likely exit the area during construction or human presence. As a result of proposed construction activities for the

breakwater and increased human activity from the snorkel trail, this project may have direct or indirect adverse effects on sturgeon in this area.

Sea turtles: The project location does not intersect with any identified sea turtle critical habitat in water or on land. However, sea turtles use the waters and beaches along the Gulf of Mexico shoreline of Perdido Key to breed and nest. The range of sea turtles suggests they could, but are unlikely to, occur in the action area. The turtles' ability to avoid activity in the area makes impacts to sea turtles unlikely. Because sea turtles are not anticipated to be in the action area, this project is not anticipated to have any direct or indirect adverse effect on sea turtles.

West Indian manatee and other marine mammals: The project location does not intersect with any identified critical habitat for the West Indian manatee, but they are present in Perdido Bay. There is a bottlenose dolphin stock in the Perdido Bay and River. Marine mammals are affected by vibrations and noise resulting from construction activities (e.g., generators, pile drivers, etc.). This project includes in-water work for the construction of a breakwater and snorkeling trail, with anticipated increases in human use in-water after construction. If manatees are present, they would probably avoid the construction area or activity from recreational use. However, if manatees or dolphins were spotted in the vicinity during construction, appropriate conservation measures would be undertaken to avoid adverse impacts associated with noise from construction activities. To avoid and minimize impacts the BMPs identified within the Sea Turtle and Smalltooth Sawfish Construction Conditions (NMFS 2006) and the Standard Manatee Conditions for In-Water Work (USFWS 2011) would be implemented and adhered to during periods of in-water work. As noted in these documents, these conditions require stopping operation of any equipment if manatees come within 50 feet of the equipment until the animals leave the project area of their own volition. As a result of construction-related activities from the breakwater and snorkel trail, this project may have direct and/or indirect short-term adverse effects on the West Indian manatee and other marine mammals.

Red knot and piping plover: Red knot and piping plover may, but are unlikely to, forage and rest in and around the action area. Noise from construction activities and increased recreational use could disturb resting and foraging birds. If disturbed while foraging during construction activities, these birds can move to other suitable habitat to continue foraging and resting. However, by implementing mitigation measures (BMPs) these short-term construction and recreational use impacts should be minimal. As such, this project is not expected to have any direct or indirect adverse effects on red knot and piping plover. Short-term as well as long-term adverse impacts to biological resources would occur on-site as a result of construction and increased recreational activities. Long-term impacts associated with habitat and wildlife disturbance from visitors on the site are anticipated to be minor.

In summary, because the construction activities would be localized to the site and habitat fragmentation would be limited, impacts from to biological resources would be minor, adverse, short- and long-term.

Socioeconomic Resources

The project would be expected to result in a short-term increase in construction jobs. During the construction phase of this project, equipment and land-based operations would be located in previously

disturbed areas and parking lots. To the extent required, the use of construction equipment, including equipment used for the movement and placement of materials (i.e., barges) and barriers enacted to protect public safety would result in some minor to moderate short-term adverse impacts on aesthetics and visual quality. These impacts result from the presence of equipment, barriers and construction-related dust and emissions. During the construction period, visible impedances would detract from the natural landscape and create visual contrast for observers visiting the project areas.

Short-term closures of public areas may be required to accommodate construction activities, including boat traffic within the Intracoastal Waterway during the breakwater construction. Over the long-term, the new snorkeling trail, improved habitat, and underwater educational signage would provide more recreational opportunities and could increase visitation. However, concerns exist with regard to potential hazards of having increased snorkeling use nearby an active boat channel.

In summary, if implemented, the project is anticipated to result in short-term minor adverse impacts to existing infrastructure and utilities, tourism and recreation, and aesthetics and visual resources. The alternative could also pose some increased risk of human and boat interactions due to the location of the project near an active boat channel. Project improvements would provide benefits and amenities to park visitors over the long-term.

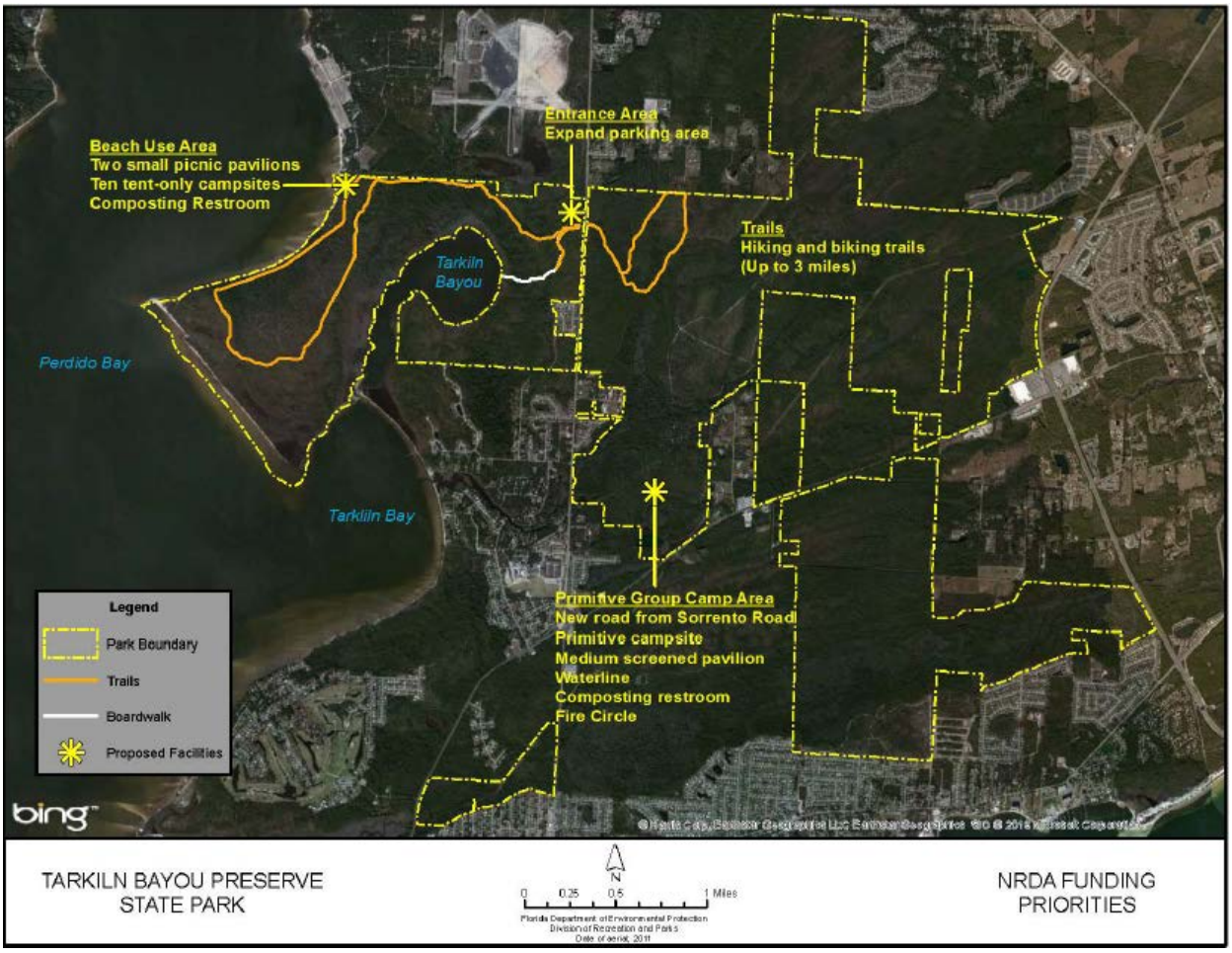
4.5.3 REC2, Tarkiln Bayou Preserve State Park Improvements

Tarkiln Bayou Preserve State Park is an approximately 4,197-acre park on Perdido Bay in southeastern Escambia County (Figure 4-6). Specifically, this project would include:

- Expansion of the parking area at the entrance to the park;
- Construction of a paddle-craft launch at the end of the existing boardwalk into Tarkiln Bayou;
- Enhancements to Dupont Road (approximately two miles) from the parking entrance area to the beach-use area (e.g., subgrade firelines, low water crossings, 3,900-foot geotextile fabric repair);
- Construction of a small parking area, two small picnic pavilions, ten tent-only campsites, and one composting restroom at the beach-use area.

These additions would enhance the public's access to the surrounding natural resources and enhance recreational experiences. Additional details on the project are provided in Chapter 2 (Section 2.5.4).

Figure 4-6 Tarkiln Bayou Preserve State Park Improvements Project Area



4.5.3.1 Affected Environment

Physical Resources

Tarkiln Bayou Preserve State Park is in the Coastal Plain Province located on Perdido Bay in the Perdido River and Bay watershed. Soils in the park are classified as predominantly sands (Pickney, Croatan and Pickney, Leon, Hurricane, Foxworth, Lakeland, Allanton-Pottsburg complex), with some Croatan muck, Direго muck, and Dorovan muck (USDA NRCS 2018). The improvements are proposed for soils mainly classified as Croatan muck, Lakeland sand, Foxworth sand, Leon sand, and Pickney sand. The park contains multiple FEMA-designated Flood Zones (FEMA 2018). Most of the improvements in the beach use area are located in Zone AE, areas with a 1 percent probability of flooding each year, and Zone X, areas of minimal flood hazard. The entrance area is in Zone X.

Biological Resources

Habitat at the site consists of maritime hammock, mesic flatwoods, sandhill, xeric hammock, basin swamp, baygall, wet flatwoods, wet prairie, blackwater stream, seepage streams, tidal marsh, and ruderal. There are minimal existing developed areas on Tarkiln Bayou, specifically roads and some signage. There are various estuarine, palustrine, freshwater emergent, freshwater forested, and marine

wetland designations (based on the most updated wetland assessment; USFWS 2018b) within Tarkiln Bayou. Based on available information, it is unknown if there is any SAV in the waters of Tarkiln Bayou or the frontage of the park on Perdido Bay (Google Maps 2018; NOAA OR&R, UNH, and USEPA 2018). EFH for coastal migratory pelagics, stone crabs, reef fish, red drum, and shrimp is present in Perdido Bay surrounding the park, but is not present in Tarkiln Bayou (NOAA OR&R, UNH, and USEPA 2018).

Fish and wildlife potentially present in and around the site include migratory birds and select aquatic and terrestrial protected species. Migratory birds could potentially use this site for nesting, resting, foraging, and roosting. Potential migratory bird groups include wading birds (e.g., rails, scoters), shorebirds (e.g., tern, skimmers, plovers), raptors (e.g., eagles, kites), and songbirds (e.g., sparrows, warblers, woodpeckers). There is potential for bald eagles to be present at this site (USFWS 2018a).

The list of federally threatened, endangered, proposed, candidate, and other species of concern for this site, as identified through USFWS IPaC, is presented in Table 4-11 (USFWS 2018a). There is no critical habitat in the project area. A list of all state and federally listed species found in this watershed is presented in Appendix E.

Table 4-11 Federally listed species potentially occurring in the Tarkiln Bayou Preserve State Park Improvements project area

Common Name	Scientific Name	Habitat	Status	Likelihood
Gulf sturgeon	*Acipenser oxyrinchus desotoi*	Estuarine: various Marine: various habitats Riverine: alluvial and blackwater streams.	T	Potentially
Reticulated flatwoods salamander	*Ambystoma bishopi*	Palustrine: wet flatwoods, dome swamp, basin swamp, Terrestrial: mesic flatwoods (reproduces in ephemeral wetlands within this community).	E	Potentially
Eastern indigo snake	*Drymarchon corais couperi*	Terrestrial: mesic flatwoods, upland pine forest, sandhills, scrub, scrubby flatwoods, rockland hammock, ruderal.	T	Unlikely
Gopher tortoise	*Gopherus polyphemus*	Terrestrial: sandhills, scrub, scrubby flatwoods, xeric hammocks, coastal strand, ruderal.	C	Likely
Green sea turtle	*Chelonia mydas*	Stays near the coastline and in bays near SAV habitats. They breed adjacent to the shoreline, and nest on sandy beaches.	T	Unlikely
Hawksbill sea turtle	*Eretmochelys imbricata*	Forages around coral reefs; spends time in bays and estuaries. They breed adjacent to the shoreline, and nest on sandy beaches.	E	Unlikely
Kemp's Ridley sea turtle	*Lepidochelys kempii*	Forage in sargassum and open waters. They breed adjacent to the shoreline, and nest on sandy beaches.	E	Unlikely
Leatherback sea turtle	*Dermochelys coriacea*	Forages in the open ocean waters. They breed in deep waters adjacent to the shoreline, and nest on sandy beaches.	E	Unlikely
Loggerhead sea turtle	*Caretta caretta*	Forages in the open ocean and shallow coastal waters. They breed adjacent to the shoreline, and nest on sandy beaches.	T	Potentially
Piping plover	*Charadrius melodus*	Estuarine: exposed unconsolidated substrate	T	Likely

Common Name	Scientific Name	Habitat	Status	Likelihood
		Marine: exposed unconsolidated substrate Terrestrial: dunes, sandy beaches, and inlet areas; mostly wintering and migrants.		
Red knot	*Calidris canutus rufa*	Estuarine: bays, tidal flats, salt marshes Terrestrial: sandy beaches Marine: aerial, near shore.	T	Likely
Red-cockaded woodpecker	*Picoides borealis*	Terrestrial: mature pine forests.	E	Potentially
Wood stork	*Mycteria americana*	Estuarine: marshes Lacustrine: floodplain lakes, marshes (feeding); Palustrine: marshes, swamps, roadside ditches.	T	Likely
West Indian manatee	*Trichechus manatus*	Estuarine: SAV, open water Marine: open water, SAV.	T	Potentially
Note: Species determined to be "Unlikely" to be found in the action area are not addressed further in this analysis. E=Endangered, T=Threatened, SAT=Similarity of Appearance (Threatened), C=Candidate, SSC=Species of Special Concern, CH=Critical Habitat.				

Socioeconomic Resources

Tarkiln Bayou Preserve State Park contains many wetlands. The property contains unique natural resources and opportunities for resource-based outdoor recreation, including fishing, hiking, picnicking and birding. The site is owned by the State of Florida (FDEP 2006). The existing infrastructure on the site includes trails, a boardwalk, picnic pavilions, restrooms and a parking lot. There are no designated protected view sheds in the vicinity of this project.

4.5.3.2 Environmental Consequences

Physical Resources

This project includes in-water work for a kayak launch. The overwater area of the amenities would be dependent upon final design, but for the purposes of this RP/EA, it is assumed to be less than 1,000 square feet. The launch may include placement of new pilings. Piling installation would use the least invasive techniques (e.g., jetting, pushing, or driving the piles) where possible, but could use impact hammers, given substrate and construction cost considerations. In-water dredging or digging associated with installation of the pilings for the launch is not anticipated, though substrate displacement and compaction from piling installation would be expected. Depth would be subject to final design, but there would a small volume of substrate displaced in the marine environment and adjacent areas (approximately 100 square feet) from the piling installation. During construction, BMPs and boom placement along with other avoidance and mitigation measures required by state and federal regulatory agencies would be employed to minimize any water quality and sedimentation impacts.

Digging would also occur in the terrestrial environment, over approximately 200 acres (estimated for the purposes of this RP/EA). Most of the area where the amenities would be constructed has not seen previous development or disturbances. Construction and digging activities, including staging areas for construction equipment, would utilize existing development footprints and disturbed areas where possible, or areas where improvements would be sited, but digging and staging equipment would disturb some soils. Enhancements to Dupont Road (approximately two miles) from the parking entrance

area to the beach-use area (e.g., subgrade firelines, low water crossings, and 3,900-foot geotextile fabric repair) would cause disturbance to soils and hydrology. The road would likely result in moderate, long-term and adverse impacts to hydrology, including sheet flow, in the area. The composting restrooms would not need connections to water and sewer lines. The specific needs would be determined during final designs. Terrestrial work that may affect hydrology and water quality includes construction of additional impervious surfaces such as roads, parking area, pavilions, and restrooms. Additional impervious surfaces would alter onsite stormwater run-off. Pervious pavement would be used in the parking area to minimize runoff and potential water quality impacts, if feasible.

Specific mitigation measures would be implemented during construction to minimize erosion and overall soil impacts. Construction involving ground disturbances from proposed improvements including construction of impervious surfaces and site preparation activities would have short-term minor and long-term adverse impacts on geology, substrates, and water quality, and moderate long-term adverse impacts on hydrology.

In summary, the project would have short-term and long-term minor to moderate adverse impacts to physical resources.

Biological Resources

Construction activities could result in short-term impacts to aquatic habitat due to erosion and increased turbidity during construction. The release of sediments during in-water and terrestrial construction would be controlled using BMPs and mitigation to protect aquatic habitat, prevent the transport of sediment into waterways, confine impacts to construction sites, and minimize the magnitude of the impacts on water quality in Tarkiln Bayou and Perdido Bay.

Improvements would avoid wetlands to the extent practical and feasible and are subject to regulatory consultations depending on the final design. An analysis of SAV, likely via aerial imagery analysis and field survey, would be conducted prior to the start of construction. The kayak launch would need piling installation, which would have minimal effects on EFH resulting from the project. Specific conservation and mitigation measures would be implemented during the finalization of engineering and design plans and construction to minimize erosion and overall habitat impacts. Any work in waters of the U.S., including wetlands, associated with this alternative would be coordinated with the USACE pursuant to the CWA Section 404 and RHA. USACE and NMFS construction guidelines would be followed, where possible (USACE and NMFS 2001); however, final placement and design would include considerations for ADA compliance.

The FL TIG would coordinate with the USFWS and review this project for impacts to bald eagles and migratory birds in accordance with the Bald and Golden Eagle Protection Act (BGEPA) of 1940 (16 U.S.C. §§ 668–668d) and the Migratory Bird Treaty Act of 1918 (MBTA) (16 U.S.C. §§ 703–712) to ensure that appropriate conservation measures and BMPs would be incorporated into the project. To the extent possible, construction activities would avoid specific habitat locations onsite if there are known nesting birds and avoid nesting seasons. Pre-construction nesting surveys for migratory birds and raptors would be conducted and if evidence of nesting is found, the FL TIG would coordinate with the USFWS to

develop and implement appropriate conservation measures. At a minimum, trees/shrubs with active nests would be flagged and avoided. To avoid or minimize impacts to migratory birds from increased human activity, tree removal would be minimized and trails would divert and concentrate recreational users away from any important nesting, foraging, or rookery locations. Additionally, signage would be installed near camping and picnic areas to provide users information on sensitive species in the area and actions to take to avoid or minimize impacts to sensitive species. Foraging and resting birds may temporarily be displaced during construction or recreation activities. Bird roosting would not be affected because construction activities and most human use would occur during daylight hours, with the exception of the camping area. The beach-use area, due to the nature of the activity area, would need to be sited in an area that did not disrupt any rookery areas.

The FL TIG would coordinate and complete consultation with relevant regulatory agencies, if necessary, on this project regarding potential impacts to protected species and habitats prior to project implementation. Surveys would be completed to determine if protected species are present at the site. If protected species were present, conservation measures recommended during consultation would be incorporated into final project design and implementation to avoid or minimize impacts to protected species and critical habitats. Specific conservation measures would also be implemented during construction to avoid or minimize disruption and overall impacts to protected species. Below is a list of potential protected species at Tarkiln Bayou, effects from the project activities, and potential conservation measures.

Gulf sturgeon: While there is the potential for sturgeon to be in the waters during the time of construction, it is unlikely. Sturgeon are only recently found in Perdido Bay. Potential impacts to the sturgeon include elevated noise levels and the presence of suspended sediments in the water column due to construction activities. This species is mobile and would likely exit the area during construction. Because of the short-term duration of the launch construction, mobility of the species, and the likelihood of sturgeon being present in the action area, this project is not anticipated to have any direct or indirect adverse effects on sturgeon.

Sea turtles: The project location does not intersect with any identified sea turtle critical habitat in water or on land. However, sea turtles, specifically loggerhead, use the waters and beaches along the Gulf of Mexico shoreline of Perdido Key to breed and nest. The range of sea turtles suggests they could, but are unlikely to, occur in the action area. The turtles' ability to avoid activity in the area makes impacts to sea turtles unlikely. Because sea turtles are not anticipated to be in the action area, this project is not anticipated to have any direct or indirect adverse effect on sea turtles.

West Indian manatee and other marine mammals: The project location does not intersect with any identified critical habitat for the West Indian manatee, but they are present in Perdido Bay. There is a bottlenose dolphin stock in the Perdido Bay and River. Marine mammals are affected by vibrations and noise resulting from construction activities (e.g., generators, pile drivers, etc.). This project includes in-water work for the construction of a paddle-craft launch. If manatees or marine mammals are present, they would probably avoid the construction area or activity. However, if spotted in the vicinity during construction, appropriate conservation measures would be undertaken to avoid adverse impacts

associated with noise from construction activities. To avoid and minimize impacts the BMPs identified within the Sea Turtle and Smalltooth Sawfish Construction Conditions (NMFS 2006) and the Standard Manatee Conditions for In-Water Work (USFWS 2011) would be implemented and adhered to during periods of in-water work. As noted in these documents, these conditions require stopping operation of any equipment if manatees come within 50 feet of the equipment until the animals leave the project area of their own volition. As a result of construction related activities from the launch, this project may have direct and/or indirect short-term adverse effects on the West Indian manatee and other marine mammals.

Red knot and piping plover: Red knot and piping plover may forage and rest in and around the action area, however are generally not present along the Gulf coast during the summer months (approximately May to August). However, construction may need to occur in other months which could generate construction noise and disturbance to resting and foraging birds, should they be present on the site or in the action area. If the birds are present during construction, they would likely move to another area to continue foraging or resting. As such, this project is not anticipated to have any short- or long-term effects to red knot.

Red-cockaded woodpecker: As long as no pine trees are removed, there would be no long-term effect on the species. If species are present in the action areas during construction, they may be affected by the noise, but could move away from the site without any long-term effects. As such, pine tree removal would be avoided wherever possible. This project may affect red-cockaded woodpecker, but it is not likely to adversely affect this species.

Wood stork: The wood stork could rest and forage in swamp or wooded areas at or nearby project locations. Because this species is highly mobile, any construction activities that may disturb this species would result in the wood stork leaving the area. A nesting survey would need to be conducted prior to construction. As such, this project is not likely to have short- or long-term direct or indirect adverse effects on the wood stork.

Reticulated flatwoods salamander: There is minimal preferable habitat for the reticulated flatwoods salamander on the project site. Although the salamander could occur, it is not likely to be present in the action area. However, if any salamanders are encountered onsite, construction would be halted and USFWS would be contacted. As such, this project is likely to have no beneficial or adverse effects on salamanders.

Gopher tortoise: Gopher tortoises could occur onsite. However, if any gopher tortoise burrows are detected during construction, construction would be halted and USFWS would be contacted and consulted and burrows would be avoided or relocated where possible. Improvements in and near preferable habitat would be avoided where possible or designed to minimize impacts. As such, there may be short-term minor adverse effects on the gopher tortoise.

Short as well as long-term adverse impacts to biological resources would occur onsite as a result of construction in undisturbed habitats and increased recreational activities. Long-term impacts associated with habitat and wildlife disturbance from visitors on the site are anticipated to be minor to moderate.

In summary, because the construction activities would be localized and there would be some permanent habitat removal, but removal would be avoided where possible, impacts from this project to biological resources would be minor to moderate, adverse, short- and long-term.

Socioeconomic Resources

The project would be expected to result in a short-term increase in construction jobs. During the construction phase of this project, equipment and operations would likely be located in previously disturbed areas and parking lots. To the extent required, the use of construction equipment, including equipment used for the movement and placement of materials (i.e., barges) and barriers enacted to protect public safety would result in some minor to moderate short-term adverse impacts on aesthetics and visual quality. These impacts result from the presence of equipment, barriers and construction-related dust and emissions. During the construction period, visible impedances would detract from the natural landscape and create visual contrast for observers visiting the project areas. Short-term closures of public areas may be required to accommodate construction activities, which could adversely affect visitors.

Over the long-term, the infrastructure improvements included in this project would impact the appearance of the land, creating a more developed appearance. However, it would also provide short-term employment from construction activities, as well as more and enhanced recreational opportunities over the long-term. In summary, the project is anticipated to result in short-term minor adverse impacts to existing infrastructure and utilities, aesthetics and visual resources, and tourism and recreation. However, the project improvements would provide benefits and amenities to park visitors over the long-term.

In summary, the project would result in short-term minor adverse and long-term benefits to socioeconomic resources.

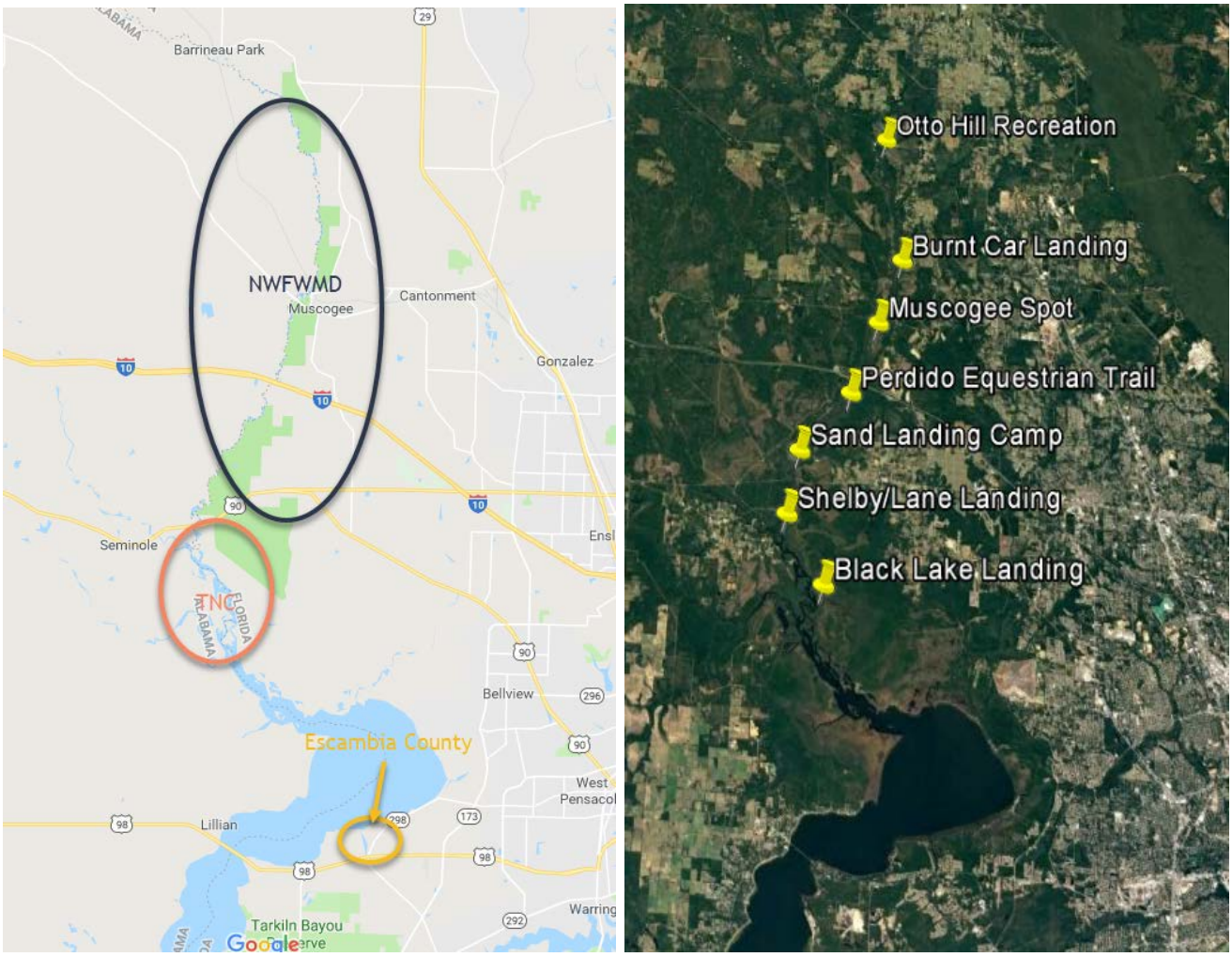
4.5.4 REC3, Perdido River and Bay Paddle Trail (Preferred)

This project is proposed for the Florida side of the Perdido River (which borders Alabama). The improvements would occur at seven discrete locations within district lands (Figure 2-5 and 2-7 in NWFWMD 2017a; Figure 4-7). Specifically, the project would include:

- Construction (by NWFWMD) of seven elevated shelters at five sites along the Perdido River;
    - Burnt Car Landing– shelter with composting toilet;
    - Muscogee Site – shelter with composting toilet;
    - Horse Trail Site – shelter with composting toilet;
    - Sand Landing – two shelters with composting toilets and an improved canoe launch;
    - Otto Hill Site – two shelters with composting toilets;
- Construction (by TNC) of two shelters and kiosks on the Perdido River Nature Preserve;
- Construction (by Escambia County) of an entrance drive, a parking area, and a shelter at Heron Bayou.

The action areas for the project take place predominantly in terrestrial and freshwater habitats. Additional details on the project are provided in Chapter 2 (Section 2.5.4).

Figure 4-7 Location of Perdido River and Bay Paddle Trail Project Sites



4.5.5.1 Affected Environment

Physical Resources

The action area is predominantly low lying and flat. The soils in the area are predominantly Dorovan muck and Fluvaquents (UDSA NRCS 2018). This soil is frequently flooded and poorly drained.

The action area is located along the Perdido River and within Heron Bayou. The Perdido River has its headwaters in southern Alabama and discharges to Perdido Bay. In its lower reaches, the river is a tannin-stained blackwater stream, and the upper portion of the river is a shifting sand river system. The Perdido River has been designated as an OFW. Heron Bayou is located adjacent to Perdido Bay and contains Bridge Creek. The project area is within the FEMA-designated flood zone AE, areas considered to be at high risk of flooding (FEMA 2018). The tidal extent in Perdido Bay extends to the area around the confluence of the Blackwater River and Perdido River. The Black Lake Landing site and work on Escambia County land, are the only project sites that are along the river and bay that have tidal influence.

Biological Resources

Habitats along the Perdido River include hardwood swamps, mixed hardwood/pine forest, longleaf pine/wiregrass, flatwoods, and wet prairie habitat areas. Shrubs found in the area include wax myrtle, titi, and yaupon holly. Red maple, southern magnolia, and redbay are common hardwood species. Wiregrass, bluestems, Indian Grass, and rare pitcher plants are also found in the area. There are various estuarine and marine, freshwater emergent, and freshwater forested/shrub wetlands in the project area according the most recent National Wetlands Inventory (USFWS 2018b).

Based on available information, no SAV is present in this extent of the Perdido River adjacent to NWFWMD, TNC, or Escambia County project sites (Google Maps 2018, NOAA OR&R, UNH, and USEPA 2018). EFH for coastal migratory pelagics, stone crabs, reef fish, shrimp, and red drum is present in the southern portion of the Perdido River, with the upriver extent of EFH (for all except shrimp) extending to the Black Lake Landing site, where in-water work is proposed. EFH for shrimp extends upriver to the most northerly site at Burnt Car Landing. There is in-water work proposed at the NWFWMD Sand Landing site that would intersect shrimp EFH.

Fish and wildlife potentially present in and around the sites include migratory birds and select aquatic and terrestrial protected species. Migratory birds could potentially use this site for nesting, foraging, roosting, and breeding. Potential migratory bird groups include wading birds (e.g., rails), shorebirds (e.g., terns, plovers, and skimmers), raptors (e.g., bald eagles, and kites), and songbirds (e.g., sparrows, warblers, and woodpeckers). There is potential for bald eagles to be present at this site (USFWS 2018a). Although these species could occur onsite, they are not known to inhabit or nest in the action areas or in the nearby vicinities.

The list of federally threatened, endangered, proposed, candidate, and other species of concern for these sites, as identified through USFWS IPaC, is presented in Table 4-12 (USFWS 2018a). There are no terrestrial or aquatic critical habitat designations in the action areas for the project. A list of all state and federally listed species found in this watershed is presented in Appendix E.

Table 4-12 Federally listed species potentially occurring in the Perdido River and Bay Paddle Trail project area

Common Name	Scientific Name	Habitat	Status	Likelihood
Gulf sturgeon	*Acipenser oxyrinchus desotoi*	Estuarine: various habitats; Marine: various habitats; Riverine: alluvial and blackwater streams.	T	Potentially
Reticulated flatwoods salamander	*Ambystoma bishopi*	Palustrine: wet flatwoods, dome swamp, basin swamp; Terrestrial: mesic flatwoods (reproduces in ephemeral wetlands within this community).	E	Unlikely
Eastern indigo snake	*Drymarchon corais couperi*	Terrestrial: mesic flatwoods, upland pine forest, sandhills, scrub, scrubby flatwoods, rockland hammock, ruderal.	T	Potentially
Gopher tortoise	*Gopherus polyphemus*	Terrestrial: sandhills, scrub, scrubby flatwoods, xeric hammocks, coastal strand, ruderal.	C	Potentially
Green sea turtle	*Chelonia mydas*	Stays near the coastline and in bays near SAV	T	Unlikely

Common Name	Scientific Name	Habitat	Status	Likelihood
		habitats. They breed adjacent to the shoreline, and nest on sandy beaches.		
Hawksbill sea turtle	*Eretmochelys imbricata*	Forages around coral reefs; spends time in bays and estuaries. They breed adjacent to the shoreline, and nest on sandy beaches.	E	Unlikely
Kemp's Ridley sea turtle	*Lepidochelys kempii*	Forage in sargassum and open waters. They breed adjacent to the shoreline, and nest on sandy beaches.	E	Unlikely
Leatherback sea turtle	*Dermochelys coriacea*	Forages in the open ocean waters. They breed in deep waters adjacent to the shoreline, and nest on sandy beaches.	E	Unlikely
Loggerhead sea turtle	*Caretta caretta*	Forages in the open ocean and shallow coastal waters. They breed adjacent to the shoreline, and nest on sandy beaches.	T	Unlikely
Red knot	*Calidris canutus rufa*	Estuarine: bays, tidal flats, salt marshes; Terrestrial: sandy beaches; Marine: aerial, near shore.	T	Unlikely
Red-cockaded woodpecker	*Picoides borealis*	Terrestrial: mature pine forests.	E	Potentially
Wood stork	*Mycteria americana*	Estuarine: marshes; Lacustrine: floodplain lakes, marshes (feeding); Palustrine: marshes, swamps, roadside ditches.	T	Potentially
West Indian manatee	*Trichechus manatus*	Estuarine: SAV, open water; Marine: open water, SAV.	T	Unlikely
Note: Species determined to be "Unlikely" to be found in the action area are not addressed further in this analysis. E=Endangered, T=Threatened, SAT=Similarity of Appearance (Threatened), C=Candidate, SSC=Species of Special Concern, CH=Critical Habitat.				

Socioeconomic Resources

The action area would include several sites located along the Perdido River on state-owned lands, on one site owned by Escambia County, and within the Perdido River Preserve, which is owned and managed by TNC. The preserve provides recreational and educational opportunities including bird watching, hiking and kayaking; entrance is free and open to the public. The action areas are all designated as state-use land type or are owned by TNC (NWFWMD 2017a). The areas adjacent to the southern extent of the Perdido River are relatively undeveloped. There are several housing developments near Heron Bayou. A hiking trail is located within the preserve with a parking area on Hurst Hammock Road. There are no designated protected view sheds in the vicinity of this project.

4.5.5.2 Environmental Consequences

Only those resource areas for which potential impacts are expected are discussed in detail in for this alternative. The FL TIG analyzed the following resources in more detail below:

- **Physical Resources** – Geology and Substrates, Hydrology and Water Quality
- **Biological Resources** – Habitats, Wildlife Species, Marine and Estuarine Fauna, Protected Species

- **Socioeconomic Resources** – Socioeconomics, Land and Marine Management, Tourism and Recreational Use, Aesthetics and Visual Resources.

Physical Resources

Implementation of this project could include use of heavy construction equipment, such as bulldozers, trucks, backhoes, tractor trailers, cranes, small excavators, fork lifts, asphalt machine, roller, small power tools, generators, small trucks, and hand tools. Construction vehicles and equipment would enter each site from a nearby highway or road (i.e., there would not be any water-based access) and would utilize previously existing roads, parking areas, and disturbed areas.

The overwater area of the amenities would be dependent upon final design, but for the purposes of this RP/EA, they are assumed to each be less than 1,000 square feet. This project may require in-water work for the improvement of the canoe launch at Sand Landing and Black Lake Landing. Any placement of new pilings for the canoe launch would use the least invasive techniques (e.g., jetting, pushing, or driving the piles) where possible, but could use impact hammers given substrate and construction cost considerations. In-water dredging or digging associated with installation of the pilings for the docks is not anticipated, though substrate displacement and compaction from piling installation would be expected. Depth would be subject to final design, but there would a small volume of substrate displaced in the marine and adjacent areas (approximately 35 square feet for each launch) from the piling installation. During construction, BMPs and boom placement along with other avoidance and mitigation measures required by state and federal regulatory agencies would be employed to minimize any water quality and sedimentation impacts.

Excavation would also occur in the terrestrial environment for construction of shelters, restrooms, entrance drive, parking, and kiosks. There would be approximately 300 and 200 square feet of soils disturbed per NWFWMD, TNC, and Escambia shelter, respectively. There would likely be less than 50 square feet of soils disturbed from installation of TNC kiosks and restrooms would likely disturb less than 75 square feet of soils. Construction and digging activities, including staging areas for construction equipment, would utilize existing development footprints and disturbed areas where possible (e.g., existing roads into the site), but digging and staging equipment would disturb some soils. The restrooms are likely to be composting toilets or portable units that do not need connections to sewer or water. Although development of canoe launches would impact soils and sediments, they would concentrate activity along the shoreline and ultimately reduce the impacts to the shoreline. Terrestrial work that may affect hydrology and water quality includes construction of additional impervious surfaces such as bathrooms, road, parking lot, and shelters. Additional impervious surfaces could alter onsite stormwater run-off. In-water activities can temporarily impact water quality by increasing turbidity.

Specific mitigation measures would be implemented during construction to minimize erosion and overall soil impacts. Construction involving ground disturbances from proposed improvements including construction of impervious surfaces and site preparation activities would have short-term minor and long-term adverse impacts on geology, substrates, hydrology, and water quality.

In summary, the project would have short-term and long-term minor adverse impacts to physical resources.

Biological Resources

Construction activities in water and on land associated with this project could result in short-term impacts to aquatic habitat due to erosion and increased turbidity during construction. The release of sediments during in-water and terrestrial construction would be controlled using BMPs and mitigation to protect aquatic habitat, prevent the transport of sediment into waterways, confine impacts to construction sites, and minimize the magnitude of the impacts on water quality in Perdido River and Bay. Any work in waters of the U.S., including wetlands, associated with this alternative would be coordinated with the USACE pursuant to Section 404 of the CWA. Coordination with the USACE and final authorization pursuant to CWA/RHA would be completed prior to final design and construction. USACE and NMFS construction guidelines would be followed, where possible, regarding launch construction (USACE and NMFS 2001).

In-water and terrestrial improvements would avoid wetlands to the extent practical and feasible and are subject to regulatory consultations depending on the final design. There is in-water work associated with the NWFWMD project sites proposed for Sand Landing, which is in the extent of EFH. SAV is not present in this extent of the Perdido River adjacent to NWFWMD or TNC project sites. Based on the in-water work for the Perdido River and upland nature of construction activities, it is anticipated there would be minimal effects on EFH resulting from the project. Specific conservation and mitigation measures would be implemented during the finalization of engineering and design plans and construction to minimize erosion and overall habitat impacts.

Construction equipment and staging areas could impact habitat, but as noted previously, these would be sited on existing development footprints, where possible, to minimize impacts. Although the launches, restrooms, parking lot, entrance drive, and shelters could potentially impact habitats and biological resources (e.g., clearing of vegetation, shoreline development), the launches would concentrate human activity and reduce overall long-term impacts to the shoreline. The shelters and restrooms would remove habitat within the structures footprint.

The FL TIG would coordinate with the USFWS and review this alternative for impacts to bald eagles and migratory birds in accordance with the Bald and Golden Eagle Protection Act (BGEPA) of 1940 (16 U.S.C. §§ 668–668d) and the Migratory Bird Treaty Act of 1918 (MBTA) (16 U.S.C. §§ 703–712) to ensure that appropriate conservation measures and BMPs would be incorporated into the project. To the extent possible, construction activities would avoid specific habitat locations onsite if there are known nesting birds and avoid nesting seasons. Pre-construction nesting surveys for migratory birds and raptors would be conducted and if evidence of nesting is found, the FL TIG would coordinate with USFWS to develop and implement appropriate conservation measures. At a minimum, trees/shrubs with active nests would be flagged and avoided. Additionally, signage would be installed near any site with potential rookeries or nesting areas to provide users information on sensitive species in the area and actions to take to avoid or minimize impacts to sensitive species. Foraging and resting birds may temporarily be displaced during

construction or recreation activities. Bird roosting would not be affected because construction activities and most human use would occur during daylight hours.

The FL TIG has begun coordinating with the relevant regulatory agencies related to potential impacts to protected species and habitats. Conservation measures recommended during formal consultation would be incorporated into final project design and implementation to avoid and/or minimize impacts to protected species and critical habitats. Specific conservation measures would also be implemented during construction to avoid and minimize disruption and overall impacts to protected species. Below is a list of protected species that were determined to be potentially directly or indirectly affected by the project.

Gopher tortoise: Gopher tortoises are not known to occur at the potential sites. However, if any gopher tortoise burrows are detected during construction, construction would be halted and USFWS would be contacted and consulted and burrows would be avoided or relocated where possible. Improvements in and near preferable habitat would be avoided where possible or designed to minimize impacts. As such, there may be short-term minor adverse effects on the gopher tortoise.

Eastern indigo snake: This snake frequently co-inhabits gopher tortoise burrows; thus would likely be subject to the same removal and relocation efforts if encountered. Although these species could occur on these sites, they are not known to inhabit the sites. Thus, while this project may affect the Eastern indigo snake, it is not likely to adversely affect this species.

Red-cockaded woodpecker: As long as no pine trees are removed, there would be no long-term effect on the species. If species are present in the action areas during construction, they may be affected by the noise, but could move away from the site without any long-term effects. As such, pine tree removal would be avoided wherever possible. This project may affect red-cockaded woodpecker, but it is not likely to adversely affect this species.

Wood stork: While the wood stork is not known to inhabit the site, it could rest and forage in swamp or wooded areas at or nearby project locations. Because this species is highly mobile, any construction activities that may disturb this species would result in the wood stork leaving the area. As such, this project is not likely to have short or long-term direct or indirect adverse effects on the wood stork.

Gulf sturgeon: Sturgeon are present in the neighboring Pensacola Bay, but have recently been documented in the Perdido Bay during the summer. As such, adverse direct or indirect effects to the sturgeon could result from construction activities in-water (e.g., noise during paddle-craft launch construction). If in-water pile driving is to occur in summer months (June-Sept.), further coordination with the FWS Panama City Field Office would be required. If sturgeon are in the area during construction, they would likely move away from the disturbances. The Construction Special Provisions: Sturgeon Protection Guidelines would be implemented if any evidence of the Gulf sturgeon is found in the action area during construction. As such, this project is unlikely to have short or long-term adverse effects on the Gulf sturgeon.

Short-term as well as long-term adverse impacts to biological resources would occur onsite as a result of construction and site preparation activities. Long-term impacts associated with habitat and wildlife disturbance from visitors on the site are anticipated to be minor.

In summary, because the construction activities would be localized to the site and habitat fragmentation would be limited, impacts from this project to biological resources would be minor, adverse, short- and long-term.

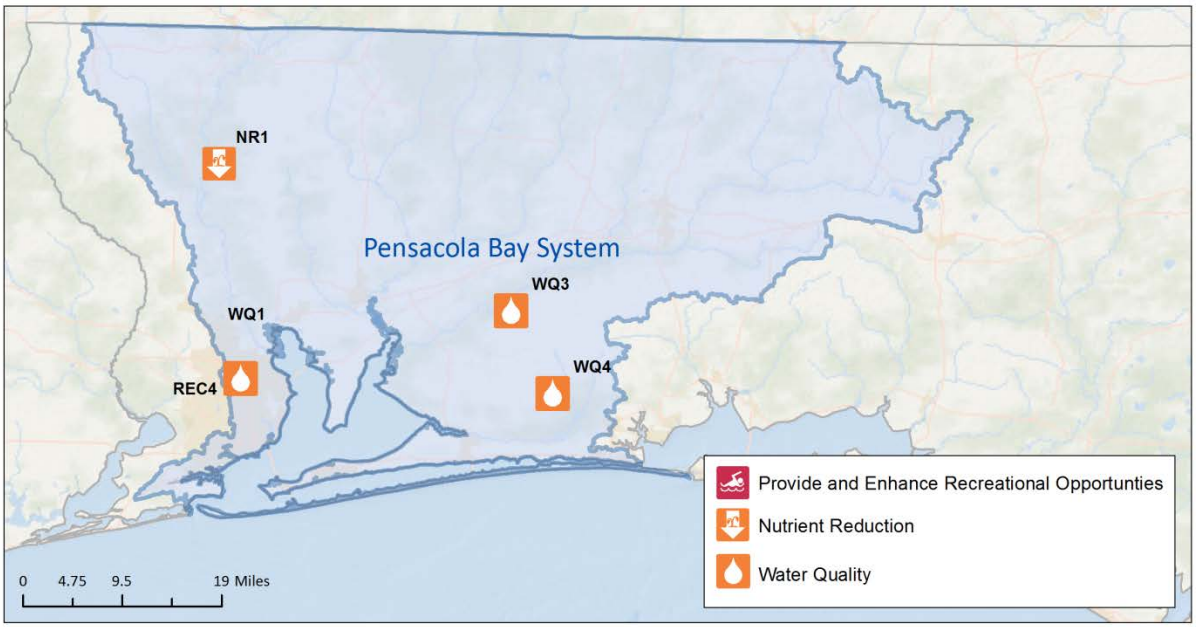
Socioeconomic Resources

During the construction phase of this project, construction equipment and operations would likely be located in previously disturbed areas and parking lots. To the extent required, the use of construction equipment, including equipment used for the movement and placement of materials (i.e., barges) and barriers enacted to protect public safety would result in some minor to moderate short-term adverse impacts on aesthetics and visual quality. These impacts result from the presence of equipment, barriers and construction-related dust and emissions. During the construction period, visible impedances would detract from the natural landscape and create visual contrast for observers. Short-term closures of public areas may be required to accommodate construction activities, which could adversely affect visitors. Further, there may be an increase in risk of paddle or powered vessel interactions due to the potential increase in paddle-craft usage in the area.

In summary, the project is anticipated to result in short-term minor adverse impacts to existing infrastructure and utilities, tourism and recreation, and aesthetics and visual resources. However, the project improvements should improve and enhance visitor experiences on the Perdido River by providing benefits and amenities to visitors over the long-term.

4.6 Pensacola Bay Watershed

Figure 4-8 Projects in Pensacola Bay Watershed



Project Index

REC4 - Carpenter Creek Headwaters Park Amenities
NR1 - Pensacola Bay and Perdido River Watersheds - Nutrient Reduction
WQ1 - Carpenter Creek Headwaters Water Quality Improvements
WQ3 - Rattlesnake Bluff Road and Riverbank Restoration
WQ4 - Pensacola Bay Unpaved Roads Initiative (P&D)

As shown in Figure 4-8, five projects are located in Pensacola Bay watershed:

- Carpenter Creek Headwaters Water Quality Improvements (WQ1);
- Carpenter Creek Headwaters Park Amenities (REC4);
- Rattlesnake Bluff Road and Riverbank Restoration (WQ3);
- Pensacola Bay Unpaved Roads Initiative (P&D) (WQ4);
- Pensacola Bay and Perdido River Watersheds - Nutrient Reduction (NR1);

The assessment for the Pensacola Bay Unpaved Roads Initiative (WQ4) is included under section 4.3 Alternatives Proposed for Planning and Design.

4.6.1 Area Overview

The contributing watershed of the Pensacola Bay system covers approximately 6,800 square miles from southern Alabama through the western Florida Panhandle. In Florida, the watershed includes most of Escambia, Santa Rosa, and Okaloosa counties and northwest Walton County. Three major rivers characterize the watershed: the Escambia, Blackwater, and Yellow rivers, as well as the smaller East Bay River. These, in turn, discharge into coastal Escambia Bay, Pensacola Bay, Blackwater Bay, East Bay, and Santa Rosa Sound. Alluvial and blackwater rivers, floodplain swamps, tidal marshes, seagrasses, and oyster beds, among other types of natural communities characterize this ecologically diverse watershed. Coastal waters support numerous species of fish, shellfish, and wildlife, and wetlands and coastal barriers buffer the impacts of storms and stormwater runoff. Physical and biological resource descriptions presented here are summarized primarily from information provided in the Pensacola Bay SWIM Plan (NWFWMD 2017b). Other sources are cited.

4.6.1.1 Physical Resources

Escambia Bay, Blackwater Bay and East Bay, as well as Grande, Chico, and Texar bayous, are all part of the Pensacola Bay. Carpenter Creek and Jones Swamp contribute to flows into the bayous near the City of Pensacola. Major bayous on Escambia Bay in Santa Rosa County are Mulatto Bayou and Indian Bayou. The City of Gulf Breeze also has large bayous on the south shore of Pensacola Bay. The three major river systems in the watershed begin as blackwater streams in southern Alabama. The Escambia River is the largest of the three, flowing 240 miles from Alabama to Escambia Bay, with 90 percent of its 4,200 square mile watershed in Alabama. The Blackwater River and its tributaries are relatively shallow sand-bottomed streams and the lower river is tidally influenced. The river basin is approximately 860 square miles in size, of which 81 percent is in Santa Rosa and Okaloosa counties. East Bay River, a smaller 15-mile river located in coastal Santa Rosa and Okaloosa counties, enters East Bay near Navarre and Eglin AFB. The Yellow River is a sand bottom river with shallow clear-tan waters. It intersects the Western Highlands Physiographic Region, where bluffs along the river are conspicuous, prior to the river discharging into Blackwater Bay from the east. The river meets with the 33-mile Shoal River near the City of Crestview. The watershed has a drainage area of about 1,365 square miles in size, mostly (64 percent) in Florida.

The Pensacola Bay watershed encompasses two localized physiographic regions in Florida: the Western Highlands subdivision of the Northern Highlands and the Gulf Coastal Lowlands. Both physiographic regions exhibit unique geology and soils. The Northern Highlands are underlain by the Citronelle formation, ancient delta deposits of clays, clayey sands, and gravel, deposited on limestone bedrock. The Coastal Lowlands are described as a flat, weakly dissected alluvial plain formed by deposition of continental sediments onto a submerged, shallow continental shelf, that were later exposed by sea level subsidence. In the Coastal Lowlands, ancient marine geomorphic features including beach ridges, spits, bars, dunes, and terraces make up the modern topography.

Agriculture, silviculture, and recreation land uses, as well as erosion of unpaved roads, have led to increased sedimentation throughout the watershed. More than 25 percent of the roads in the Yellow River have an unpaved or gravel surface and are subject to erosion, degradation, and sedimentation within watercourses, streams, and rivers. Site specific erosion and sedimentation were the predominant

factor impairing water quality at sites in the Yellow River watershed. A long history of industrial land use in the region has also resulted in several significant instances of ground water contamination. There are five U.S. EPA National Priority List (NPL) Superfund sites documented in the Pensacola Bay watershed.

The FDEP has identified 23 segments within the Pensacola Bay watershed as impaired, based on Florida's Impaired Surface Waters Rule, Chapter 62-303, FAC. Waterbody segments verified as impaired based on sufficient data and identified causative pollutants, form the list of waters for which TMDLs are or would be developed as part of the FDEP watershed management approach for protecting water resources. Nearly all segments are impaired for bacteria, two segments for nutrients, and two segments for metals (FDEP 2017). Additional bacteria impairments are concentrated in the Yellow River and Blackwater River basins. Nonpoint source pollution is carried into the Pensacola Bay system by stormwater runoff from such sources as urban and suburban lands, agricultural and forestry activities, dirt roads, pavement, construction sites, golf courses, and lawns. The low energy system also has water exchange with the Gulf, and pollutant loading has possibly been exceeding its assimilative capacity for decades.

Water quality issues identified in the watershed (NWFWMD 2017b) include: impairments for nutrients, DO, and bacteria; long-term degradation of urban bayous and Escambia Bay; vulnerability of habitats due to water quality degradation; inadequate treatment from conventional OSTDS and aging water infrastructure (e.g., leaking pipes) and resulting surface and ground water degradation; erosion and sedimentation. Eutrophication has been documented in several waterbodies across watershed, primarily in the bays and estuaries. Chemical contaminants within the sediments have been observed in many areas of the estuary, particularly within bayous Chico and Texar and in Escambia Bay.

4.6.1.2 Biological Resources

Biological resources are concentrated in natural areas outside of the developed urban and agriculture portions of the watershed. Wetlands and floodplains are most extensive along the Escambia and Yellow Rivers, Garcon Point, and the East Bay River and Jones Creek basins. Upland forests occur throughout the watershed, between the river corridors. Many of the native pine forests have been cut for timber, cleared for agriculture, or intensively managed for silviculture and uplands in the watershed are a mix of natural regeneration forests, pine plantations, agricultural lands, and development. Riparian habitats along river corridors are important to fish and wildlife. The Yellow River Marsh Preserve State Park includes tracts of wet prairie classified by the FNAI as imperiled in Florida because of their rarity. Nearly 20 rare and endangered species of plants and animals occur in the wet prairies, dome swamps, and flatwoods of this park. Conservation and recreational lands make up a substantial part of the Pensacola Bay watershed and include Blackwater River State Forest; Blackwater, Yellow, and Escambia Rivers Water Management Areas; and Garcon Point Water Management Area. Large tracts of Eglin Air Force Base (AFB) are also managed for habitat conservation and the protection of endangered species. Benthic riverine and estuarine habitats in the watershed have historically, and are presently, adversely impacted by sediment erosion and deposition. The Yellow River Basin is historically less developed than the rest of the watershed but is increasingly impacted by excessive sedimentation from stream bank erosion, particularly along unpaved road crossings, contributing to habitat degradation, adverse impacts to federally listed species, and threats to aquatic biodiversity in the basin (Herrington 2010). Degraded

water and sediment quality have also reduced the extent of SAV communities, other benthic habitats, and associated biological resources.

The Pensacola Bay watershed supports an estimated 1,400 estuarine plant and animal species, in addition to migratory species. Invertebrates include snails, insects, crustaceans, as well as threatened and endangered mussels. Thirteen species of common waterfowl winter in Pensacola Bay salt marshes (Lewis 1986). Salt marshes, SAV beds, and oyster reefs support more than 200 species of fish and shellfish reported in the Pensacola Bay system. SAV meadows are largely limited to Santa Rosa Sound, while salt marshes are more common in lower East Bay and Garcon Point in comparison with upper East and Blackwater bays. Of an estimated 235 to 245 acres of oyster reef habitat in the Pensacola Bay system, approximately 75 percent are in East Bay.

The Escambia River and the Blackwater River are two large alluvial rivers that flow south from Alabama through the Florida Panhandle to the Pensacola Bay Estuary and the Gulf of Mexico. Both basins are highly productive and serve as nurseries for commercially important shellfish and finfish, as well as a diverse array of flora and fauna.

Approximately 40 species of plants and 45 species of animals designated as state or federally threatened and endangered occur in the watershed. State and federally threatened and endangered species and their corresponding habitats and Critical Habitat (if designated) specific to the Pensacola Bay watershed are listed in Appendix E. EFH for red drum, reef fish, shrimp, and coastal migratory pelagic fish is designated in coastal waters of the watershed. Natural systems priorities in the watershed are wetland loss and degradation (e.g., Carpenter Creek); vulnerability of estuarine and coastal habitats, legacy pollutants in estuarine substrates, effects of sea level rise and saltwater intrusion; physically altered tributaries; and headwaters degradation, floodplain fragmentation, riparian buffer loss.

4.6.1.3 Socioeconomic Resources

The Pensacola Bay watershed primarily encompasses Escambia, Santa Rosa, and Okaloosa counties. Escambia County had a total population of 313,215 people, an increase of 5.3 percent since 2010, based on the 2017 U.S. Census. Escambia is demographically similar to the state of Florida as a whole, as shown in Appendix D. The percent of white individuals in Escambia County (69.4 percent) is lower than for the State of Florida and the U.S., both approximately 77 percent (U.S. Census Bureau 2018). Across all three geographic areas the percent of the population (aged 25 or older) with a high school education or higher is between 87 and 90 percent. The percent of the population (aged 16 or older) in the labor force in Escambia County (56.9 percent) is similar to that of Florida (58.5 percent) and is lower than that of the U.S. as a whole (63.1 percent) (U.S. Census Bureau 2018). Following this trend, median household income ($46,117) is similar to Florida ($48,900) and lower than the U.S. ($55,322). With respect to poverty, the percent of the population living in poverty in Escambia County (15 percent) matches the typical rate in the State of Florida, and is higher than is typical in the U.S. (12.7 percent) (U.S. Census Bureau 2018).

Santa Rosa County had a total population of 174,272 people, an increase of 15.1 percent since 2010, based on the 2017 U.S. Census. Santa Rosa County is also demographically similar to Florida and the U.S.

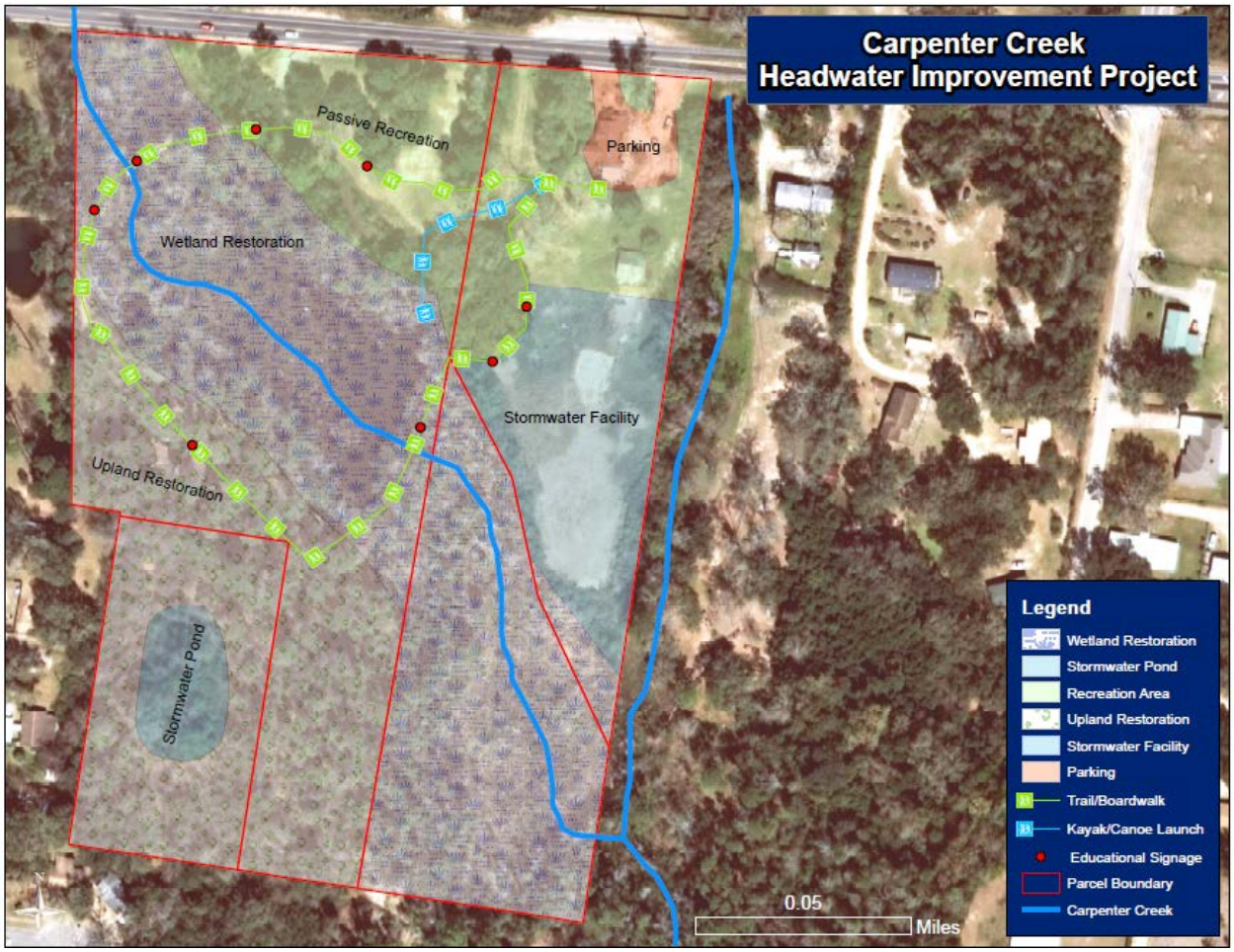
as a whole, as shown in Appendix D. The percent of white individuals in Santa Rosa County (87.2 percent) is higher than for the State of Florida and the U.S., both approximately 77 percent (U.S. Census Bureau 2018). The percent of the population (aged 25 or older) with a high school education is 90.2 percent similar to the State of Florida and for the U.S. (both 87 percent). The percent of the population (aged 16 or older) in the labor force in Santa Rosa County (56.2 percent), slightly lower but similar to the State and U.S. levels (58.5 and 63.1 percent respectively) (U.S. Census Bureau 2018). Median household income ($60,652) is higher than both the U.S. ($55,322) and Florida ($48,900). The percent of the population living in poverty is lower in Santa Rosa County (10.6 percent) than in the State of Florida and the U.S. (14.7 percent and 12.7 percent respectively; U.S. Census Bureau 2018).

Okaloosa County had a total population of 201,170 people, an increase of 11.3 percent since 2010, based on the 2016 U.S. Census. Approximately 81.6 percent of the County population is white, 10 percent are black or African American and about 8.7 percent Hispanic or Latino. The remaining population includes small percentages of American Indian, Asian, and Pacific Islander. Median household income reported in 2016 in the County was $57,655 and the percent of County residents living in poverty accounted for 10.7 percent of the population. Most of the County residents (91.3 percent) are high school graduates or higher. The county unemployment rate was 2.7 percent in 2016.

4.6.2 WQ1, Carpenter Creek Headwaters Water Quality Improvements (Preferred)

The project would retrofit existing stormwater management systems designed to provide stormwater treatment, and thereby improve water quality in Carpenter Creek and Bayou Texar, which flow into Pensacola Bay. The project is a companion to a recreational project in this RP/EA (REC5, Carpenter Creek Headwater Park), both of which would be part of the proposed Carpenter Creek and Bayou Texar Watershed Management Plan funded through Escambia County's RESTORE Direct Component funds. The project area is highly urbanized, and the project would reduce pollutant loading and hydrologic degradation in the watershed and to coastal waters by 1) restoring hydrologic flow to Carpenter Creek and 2) constructing two stormwater ponds to capture and treat stormwater runoff that flows off Olive Road into Carpenter Creek. The sinuosity of the creek channel would be restored to improve the capacity of the creek for floodwaters and thereby reduce erosion and flooding. Invasive species that have become established and spread throughout the projects due to historical filling and channeling activities would be removed and native wetland vegetation would be planted to restore habitat for native fish and wildlife. Reduced rates of stormwater would improve water quality in Carpenter Creek and Bayou Texar and reduce local flooding, and the amount of debris, sediment, nutrients, and pollutants (e.g., chemicals, fertilizers, herbicides, insecticides, salts, oil, and bacteria and solids from livestock, pets, and faulty septic systems) transported into adjacent waters and into the bay.

Figure 4-9 Conceptual Design for WQ1, Carpenter Creek Stormwater Improvements Project and REC4, Carpenter Creek Headwaters Park Amenities



4.6.2.1 Affected Environment

Carpenter creek headwaters begin in south central Escambia County, just north of I-10, in the vicinity of Olive Road. The watershed is approximately 10.5 square miles (6,760 acres) in size and the project area includes approximately 13 acres along Carpenter Creek, downstream of Olive Road. Carpenter Creek flows south from its headwaters above Olive Road south, flowing under I-10 and 12th Avenue before discharging into Bayou Texar, which in turn flows to Pensacola Bay. The project area is in an urban setting altered by construction of I-10, Olive Road, former residential homes, unpaved access paths and roads through the property, and runoff of debris and sediments into the creek. The Carpenter Creek Watershed RESTORE Proposal reported a hog farm operation in the vicinity of the headwaters until the 1980s (Albrecht 2017). The project area includes formerly developed areas (e.g., former residential homes and a farm) that would be used for access and construction staging and would reduce the disturbance to the natural uplands and wetlands in the project area. Excavation would include construction of two stormwater ponds, permanent removal or replacement of inadequate or damaged infrastructure (e.g., debris, old culverts), such as weirs or other control structures.

Physical Resources

Carpenter Creek is an urban drainage basin (87 percent urban land cover) with steep topography that receives large volumes of stormwater runoff and associated pollutants from the metropolitan Pensacola area in general and, specifically, from Olive Drive on its upstream side. Elevations along the creek and in the project area range from an estimated 86-120 feet above MSL. The project area is not within a designated Sensitive Karst Area, as identified by the NWFWMD. Ten culverts and bridges are located along the five-mile long creek.

Upland soils in the project area consist of approximately 5.87 acres (45 percent) of very deep, well-drained Bonifay loamy sands in primarily the southwest portion of the project area, which typically occur over gently sloping shoulder slopes of ridges in Escambia County. Very deep, excessively drained Lakeland sands make up another 3.03 acres (13.48 percent) of uplands along Olive. Wetland Dorovan mucks make up approximately 2.32 acres (17.89 percent) along the creek and pond, the river bank/terrace. These wetland soils are frequently flooded pond much of the year. The remaining 14 percent of the site is open water, most of which is a ponded area formed due to a beaver dam in the creek at the southern end of the project area.

Increased stormwater runoff volumes and rates due to the urban surroundings have also increased, erosion, channel alterations, and sediments in the basin and downstream into Bayou Texar. Both Carpenter Creek and Bayou Texar have been verified by FDEP as impaired for fecal coliform bacteria. In 2012, FDEP adopted a fecal coliform TMDL for both water bodies. Bacteria reductions are necessary for these water bodies to meet surface water quality standards. TMDLs require a fecal coliform reduction of 28 percent and 49 percent for the creek and bayou, respectively. Common causes of fecal coliform in waterbodies include failing septic tanks and sanitary sewer overflows resulting from heavy rainfall and subsequent inflow of stormwater or infiltration of ground water into sewer lines; leaks from aging sewer infrastructure, and inadequate or failing pumps. Sediments in streambeds or stormwater conveyance systems can act as reservoirs for contamination as bacteria persist in the sediments. The Bacteria Pollution Control Plan (BPCP) for Carpenter Creek (WBID 676) (FDEP 2016) outlines controls for addressing fecal coliform impairment in the watershed. In addition to surface water, the Sand and Gravel aquifer in the project area is vulnerable to surface and groundwater contamination due to its shallow depth and the urban and industrial land uses surrounding it.

Biological Resources

The project area includes both uplands and freshwater wetlands. Estuarine and marine resources are absent since the project area is upstream of the influence of tide and salinity. The stream channel presently receives large volumes of stormwater runoff from the surrounding urban areas that exceed its capacity for flood attenuation and nutrient assimilation, resulting in high velocity flows through the creek that result in further erosion and delivery of sediments and NPS pollutants downstream, and reducing the amount of habitat available for native plant and fish species. Invasive and nonnative plant species have become established in the wetlands and uplands along the stream channel, reducing the habitat available to native fish and wildlife species.

Nearly half (6.33 acres) of the project area is presently developed and includes low density residential home lots (Table 4-13). About 51 percent (6.65 acres) of the project area is undeveloped and is mostly uplands (4.87 acres), characterized by predominantly pine flatwoods (3.32 acres) and hardwood – pine mix (1.41 acres). Uplands in the project occur also include a mix of live oak, bluejack oak, and sand post oak in the canopy. The uplands provide a buffer to Carpenter Creek from the stormwater runoff, which flows off Olive Road and across the pine flatwoods, where it seeps into the soil, where larger sediments and pollutants can be captured while the water and smaller substances flow through the surficial soils and ultimately seep into the creek.

Wetlands in the project area are made up of the lake and associated marshes (less than one acre each). Wetlands and open water make up only 1.78 acres (13.7 percent) of the project area, compared with 4.87 acres (37.5 percent) of undeveloped uplands and 6.33 acres (48.8 percent) developed (e.g., residential homes). Native wetland habitats in the project area include swamp hardwoods, scrub-shrub, and marshes associated with the open water pond. Native vegetation species historically associated with these permanently to semi-permanently inundated wetlands includes blackgum, bald cypress, sweetbay, swamp tupelo, red maple and scattered pine.

In addition to direct habitat and associated wildlife loss, urbanization often results in the introduction and establishment of nonnative and invasive plant species that can ultimately preclude native plant species by replacing natives and thereby eliminating the habitat and food important to native fish and wildlife. Air potato (*Dioscorea bulbifera*) is the most conspicuous invasive species in the project area, growing over and shading native vegetation, including the tree canopy. Pine flatwoods and hardwood hammocks are especially vulnerable to the vine. The City of Pensacola is considering introducing the air potato leaf beetle (*Lilioceris cheni*), which defoliates the vine, as a biological control along Carpenter Creek. Other invasive species include popcorn (*Triadica sebifera*) tree and privet (*Ligustrum sinense*).

The Carpenter Creek project area is highly urbanized and therefore highly impacted, which can isolate existing species but may also provide habitat for urban wildlife, support habitat connectivity, and serve as a refuge for species impacted by urbanization in the surrounding urban area that may support upland species such as Eastern indigo snake and gopher tortoise. Carpenter Creek provides a wetland corridor for wetland dependent species to travel between uplands and the downstream Bayou Texar and Pensacola Bay. The list of federally threatened, endangered, proposed, candidate, and other species of concern for this site, as identified through USFWS IPaC and FNAI, is presented in Table 4-14 (USFWS 2018a, FNAI 2018). State and federally listed species for the watershed are provided in Appendix E.

Table 4-13 Acres of habitat in the Carpenter Creek Stormwater Improvements project area

FLUCCS Code	Acres	Percent of Total Area
Developed - Total	**6.33**	**48.77**
1110: Low Density, Fixed Single Family Units	6.30	48.54
1210: Medium Density, Fixed Single Family Units	0.03	0.23
Undeveloped - Total	**6.65**	**51.23**
Uplands	**4.87**	**37.52**
4110: Pine Flatwoods	3.32	25.60
4200: Upland Hardwood Forests	0.13	1.02
4340: Hardwood Coniferous – Mixed	1.41	10.90
Wetlands and Lake	**1.78**	**13.71**
5200: Lakes	0.85	6.54
6300: Wetland Forested Mixed	0.08	0.62
6410: Freshwater Marshes	0.76	5.83
6460: Mixed Scrub-Shrub Wetland	0.09	0.71
Grand Total	**12.98**	**100**
Note: values may not add up due to rounding.		

Table 4-14 Threatened and Endangered Species in the Carpenter Creek Stormwater Improvements project area

Common Name	Scientific Name	Habitat	Status	Likelihood
Ashe's magnolia	*Magnolia ashei*	Terrestrial: slope and upland hardwood forest, ravines	SSC	Unlikely
Giant orchid	*Pteroglossaspis ecristata*	Terrestrial: Forest Edge, Forest/Woodland, Old field, Savanna, Shrubland/chaparral, Woodland – Conifer	SSC	Unlikely
Reticulated flatwoods salamander	*Ambystoma bishopi*	Terrestrial: slash and longleaf pine flatwoods that have a wiregrass floor and scattered wetlands	E	Unlikely
Eastern indigo snake	*Drymarchon corais couperi*	Terrestrial: mesic flatwoods, upland pine forest, sandhills, scrub, scrubby flatwoods, rockland hammock, ruderal	T	Potential
Gopher Tortoise	*Gopherus polyphemus*	Terrestrial: mesic flatwoods, upland pine forest, sandhills, scrub, scrubby flatwoods, rockland hammock, ruderal	C	Potential
American alligator	*Alligator mississipiensis*	Estuarine: herbaceous wetland Riverine: river, creek, low gradient, medium river, pool, spring/spring brook Lacustrine: shallow water Palustrine: forested wetland, herbaceous wetland, riparian, scrub-shrub wetland	SAT	Potential
Red-cockaded woodpecker	*Picoides borealis*	Terrestrial: mature pine forests	E	Unlikely
Wood stork	*Mycteria americana*	Estuarine: marshes Lacustrine: floodplain lakes, marshes (feeding), various Palustrine: marshes, swamps, various	T	Potential
Note: Species determined to be "Unlikely" to be found in the action area are not addressed further in this analysis. E=Endangered, T=Threatened, SAT=Similarity of Appearance (Threatened), C=Candidate, SSC=Species of Special Concern, CH=Critical Habitat.				

Socioeconomic Resources

The proposed location of the Carpenter Creek Headwaters Park is in Pensacola, Florida; the project site is located on parcels that are adjacent to the headwaters of Carpenter Creek. Most of the surrounding environment is residential and there are several housing developments on multiple sides of the future park. The project site is currently occupied by infrastructure and debris. The project area contains formerly developed areas including, former residential homes, and unpaved access paths. There are no designated protected view sheds in the vicinity of this project.

Demographics of the watershed vary from the upper head waters to the bayou area. This project begins in an older portion of town, near Olive Road – between Davis Hwy and Old Palafox Road. The creek and tributaries originate in areas known as Ferry Pass, Brent, Ensley, and flow south into East Pensacola and the City of Pensacola. Originally known as a rural area with larger tracts of land to support farming activities, the addition of the Interstate in the 1970s changed this area into a more suburban setting. Land use changes in the last decade have taken 10 and 20-acre parcels of land and transformed them into high density subdivisions made up of patio homes at four to six homes per acre. Many of the older tracts of land are currently mobile home communities housing low income families. The older areas may not be on sewer systems due to their age and corresponding unavailability of connections to sewer systems. The upper headwaters do not have sidewalks or road side lighting.

The population in the vicinity of the project is included in the Ensley Census Designated Place (CDP) just outside the City of Pensacola. It has a population of 4,145, 64 percent of whom are white, nearly 30 percent of who are black, and the remaining 6 percent of Hispanic, Asian, American Indian, or mixed race. Unemployment in the population block is 5.2 percent and the percentage of residences below the poverty level totals 18.2 percent, compared with 15.7 percent in Escambia County. Whites make up 69.4 percent of the county population, followed by black (23 percent), Hispanic or Latino (5.6 percent), and Asian (3.2 percent). About 88 percent of the Ensley population block has at least a bachelor's degree, compared with 90 percent in Escambia County overall.

4.6.2.2 Environmental Consequences

Construction of stormwater ponds with outfall structures to Carpenter Creek to capture and treat runoff from Olive Road, enhancement of adjacent uplands to include removal of nonnative and invasive plant species, potential planting of native species, and reconnection of hydrologic features via removal of accumulated sediment and debris are planned for the project. Educational signs and a boardwalk proposed for the associated Carpenter Creek Headwaters Park recreational use project are described later under REC4. The information presented here is summarized based on information provided in the project design plans and compiled from the FGDL database, FNAI, and the Pensacola Bay SWIM Plan (NWFWMD 2018).

Physical Resources

The project would reduce the stormwater rates and associated input of sediments and pollutants into Carpenter Creek from Olive Road, and attenuate floodwaters in the basin and reduce erosion and subsequent sediment delivery downstream in Bayou Texar. Temporary short-term adverse impacts to soils, hydrology, and water quality may occur due to construction activities. However, construction

BMPs would minimize these potential impacts and no long-term or permanent adverse impacts in the project area are anticipated as a result of the construction activities. Florida Stormwater or Environmental Resource Permit (ERP) would be obtained from the applicable water management district or FDEP office before construction begins. BMPs to control erosion and sediment runoff into waters during grading and construction activities may include (but not be limited to): planting sod, planting temporary or perennial grass seed, applying mulch and/or soil binder, installing erosion control blankets, in addition to sediment barriers, such as silt fences or rock barriers, in front of inlets, as described in the State of Florida Erosion and Sediment Control Designer and Reviewer Manual (FDOT and FDEP 2013). These methods are to be determined during final design and permitting.

These improvements would assist the City of Pensacola and Escambia County in addressing water quality impairments identified for Carpenter Creek and Bayou Texar (which are listed under Section 303d of the CWA as impaired for fecal coliform) and complying with regulations governing their state-designated uses. The project directly reduces pollution and hydrologic degradation to coastal wetlands by restoring wetlands and constructing stormwater ponds that would reduce erosion as well as sediments, nutrients, and other pollutions associated with stormwater runoff, in watersheds injured by the DWH oil spill. Reducing pollutant loadings to Carpenter Creek would also benefit estuarine-dependent water column resources, oysters, and SAV in Pensacola Bay.

Long-term and permanent environmental benefits to water quality and hydrology are anticipated as a result of the project. Reduced stormwater flows and velocities would reduce erosion of existing soils. The stormwater pond and control structure would reduce the volume and velocity of stormwater flows that deliver bacteria and other pollutants into Carpenter Creek and would help to address the existing water quality impairment for bacteria. The project would reduce erosion and scouring from stormwater flows, reduce NPS and sediment inputs from Olive Road, and reduce high flows through the creek. As water moves more slowly across the land surface, it can percolate more readily into soils and the surficial aquifer, restoring soil water available to vegetation.

In summary, the project would result in short-term minor adverse impacts to physical resources, and long-term benefits.

Biological Resources

Temporary short-term adverse impacts to vegetation, habitat, and fish and wildlife may occur due to construction activities. Larger animals and birds can move downstream along the stream corridor during construction activities and would not be adversely impacted except for the temporary loss of habitat and temporary loss to open water. Wildlife, including birds, would be expected to return to the project area once construction activities have ceased.

The FL TIG has begun coordinating with the relevant regulatory agencies related to potential impacts to protected species and habitats. Surveys for listed species would be completed during final design and permitting. If a listed species is found within the project area, the County would coordinate with the FWC and USFWS with regard to permitting and avoidance and minimization of impacts to listed species. While wood storks are expected to move away from the project area during construction activities, gopher tortoises and indigo snakes may not. All three of these species are likely to occur in the project

area. No federally listed plant species are likely to occur in the project area. If listed plant species are found, the County would coordinate with FDACS with regard to permitting.

The project would have long-term and permanent benefits for habitat and fish and wildlife due to restoration of floodplain and stream channel habitats. Removal of nonnative invasive species, such as air potato and popcorn tree, would also improve the opportunity for establishment of native plant species and habitat for wildlife species. Long-term and permanent benefits to fish and wildlife and habitat are also expected as a result of the termination of ongoing adverse impacts of inadequately managed stormwater runoff and associated runoff volumes and streambank erosion. Reduced erosion and downstream sedimentation would result in restored and/or expanded habitat for wetland species such as wood storks and other wetland dependent birds and wildlife.

In summary, the project would result in short-term minor adverse impacts to biological resources, and long-term benefits.

Socioeconomic Resources

A temporary short-term increase in construction job opportunities would potentially occur as a result of the project. Long-term benefits to the local economy may occur due to the improved aesthetic and recreational value of the project area following the restoration of Carpenter Creek and the reduction in pollutants introduced to the creek from untreated stormwater runoff. The project would reduce runoff and associated pollutants into Carpenter Creek and improve water quality, resulting in long-term benefits to the local community with respect to water quality, aesthetics, recreation, and the quality of recreationally caught fish from the creek. No adverse impacts to the local economy are anticipated as a result of the project.

The project would reduce runoff and associated pollutants into Carpenter Creek and improve water quality, resulting in long-term benefits to the local community with respect to water quality, aesthetics, recreation, and the quality of recreationally caught fish from the creek. No adverse impacts to the local economy are anticipated as a result of the project.

In summary, the project could result in short-term minor adverse impacts to socioeconomic resources, and long-term benefits.

4.6.3 REC4, Carpenter Creek Headwaters Park Amenities (Preferred)

The Carpenter Creek Headwaters Park Amenities alternative would be implemented by the FDEP FL TIG Trustee in coordination with the Escambia County Natural Resources Management Division. The project includes actions to provide and enhance recreational opportunities through the construction of a public park at the headwaters of Carpenter Creek. The project is a companion to a water quality improvement project in this RP/EA (WQ1, Carpenter Creek Stormwater Improvements Project). Specifically, the project would include:

- Construction of a 2,000-foot-long trail (including an elevated boardwalk portion) that provides an access point to the lake feature on the property;

- Construction of a paddle-craft launch (as a walkway to the shoreline, not an in-water structure), passive recreation area (e.g., benches and tables), and a 12-space parking area (approximately 12,000 square feet);
- Installation of educational signage describing the benefits of this project and the companion water quality project.

These additions would enhance the public's access to the surrounding natural resources and enhance recreational experiences. Additional details on the project are provided in Figure 4-9 and Chapter 2 (Section 2.5.4).

This project is part of Pensacola's Revitalization Plan, a component of which is to create a "Carpenter Creek Headwater Park." The project area is within the city limits, within a highly urbanized watershed. Educational signs along a proposed boardwalk would tell the story of how water travels through the 'treatment train' from stormwater ponds, to wetlands, to the stream, and the bay.

4.6.3.1 Affected Environment

This project would occur at the same location as the WQ1, Carpenter Creek Stormwater Improvements project. Please refer to Section 4.6.2.1 Affected Environment for a detailed description of the resources with potential to be affected by this project.

4.6.3.2 Environmental Consequences

Only those resource areas for which potential impacts are expected are discussed in detail in for this alternative. The FL TIG analyzed the following resources in more detail below:

- **Physical Resources** – Geology and Substrates, Hydrology and Water Quality
- **Biological Resources** – Habitats, Wildlife Species, Marine and Estuarine Fauna, Protected Species
- **Socioeconomic Resources** – Socioeconomics, Land and Marine Management, Tourism and Recreational Use, Aesthetics and Visual Resources.

Physical Resources

Implementation of this project could include use of heavy construction equipment, such as bulldozers, barges, trucks, backhoes, tractor trailers, cranes, small barges with crane, small excavators, fork lifts, asphalt machine, roller, small power tools, generators, small trucks, and hand tools.

This project does not include in-water work as the kayak/canoe launch would include a walkway up to the shoreline where individuals can drag their kayak into the water. The boardwalk would be constructed to span water crossings. As such, there would be no piling installation for any overwater structure. Increased use of the paddle-craft launch as a shoreline entrance could disturb sediments and soils in the long-term by increased activity in the shoreline, potentially disturbing sediments and increasing turbidity. During construction near the water, BMPs and boom placement along with other avoidance and mitigation measures required by state and federal regulatory agencies would be employed to minimize any water quality and sedimentation impacts to Carpenter Creek.

Digging would also occur in the terrestrial environment, over approximately five acres (three acres in the north parcel and two acres in the south parcel). Most of the area where these amenities would be constructed has seen previous and ongoing disturbances and development (e.g., boardwalk, paddle-craft launch, parking lot) to minimize impacts to soils and substrates. Construction and digging activities, including staging areas for construction equipment, would utilize existing development footprints and disturbed areas where possible (e.g., driveway, parking lot), but digging and staging equipment would disturb some soils. Although development of the boardwalk would impact soils, the walkway would direct and condense foot traffic, minimizing adverse impacts. Terrestrial work that may affect hydrology and water quality includes construction of additional impervious surfaces such as the parking lot, driveway, or trails. Additional impervious surfaces would alter onsite stormwater run-off. Pervious pavement would be used in the parking area to minimize runoff and potential water quality impacts. Construction of the parking lot and boardwalk may temporarily impact water quality.

Specific mitigation measures would be implemented during construction to minimize erosion and overall soil impacts. Construction involving ground disturbances from proposed improvements and site preparation activities would have minor short- and long-term adverse impacts on geology and substrates. This project would result in short-term minor adverse impacts on water quality and hydrology due to the construction of the improvements, but long-term impacts would be mitigated by installing pervious pavement for the parking lot.

In summary, the project would have short- and long-term minor adverse impacts to physical resources.

Biological Resources

This project does not include in-water work since there would be no installation of pilings for the paddle-craft launch or boardwalk and the boardwalk would span water crossings. The boardwalk would be designed to minimize wetland impacts and no piles would be placed in water; 500 feet would be in wetlands and would be elevated, while approximately 1,500 feet would be on grade and outside jurisdictional wetlands. Placement of new piles for boardwalk construction would use the least invasive techniques (e.g., jetting, pushing, or driving the piles) where possible, given substrate and construction cost considerations, but could use impact hammers. The boardwalk would be constructed in previously developed areas (i.e., former driveway) and the canoe/kayak launch would be constructed in the existing driveway footprint, which extends to the shoreline of the water. The parking lot would be constructed over the existing parking area and would be pervious concrete.

Construction activities on land associated with this project could result in short-term impacts to aquatic habitat due to erosion and increased turbidity during construction. The release of sediments during construction would be controlled using BMPs and mitigation to protect aquatic habitat, prevent the transport of sediment into waterways, confine impacts to construction sites, and minimize the magnitude of the impacts on water quality in Carpenter Creek.

Terrestrial improvements would avoid wetlands to the extent practical and feasible and are subject to regulatory consultations depending on the final design. Since there would be no in-water work and there is no EFH or SAV in Carpenter Creek, there would be no effect to EFH or SAV resulting from the

project. Any work in waters of the U.S., including wetlands, associated with this alternative would be coordinated with the USACE pursuant to Section 404 of the CWA. Coordination with the USACE and final authorization pursuant to CWA/RHA would be completed prior to final design and construction. Specific conservation and mitigation measures would be implemented during the finalization of engineering and design plans and construction to minimize erosion and overall habitat impacts.

Construction equipment and staging areas could impact habitat, but as noted previously, these would be sited on existing development footprints, where possible, to minimize impacts. Although the passive recreation area, parking lot, paddle-craft launch, and boardwalk could potentially impact habitats and biological resources (e.g., clearing of vegetation for boardwalk), most of the improvements are proposed for currently disturbed areas. Additionally, the boardwalk and walkway to the paddle-craft launch would impact habitat, but ultimately would direct and condense foot traffic into designated areas, benefiting habitats and species over the long-term.

The FL TIG would coordinate with the USFWS and review this project for impacts to bald eagles and migratory birds in accordance with the Bald and Golden Eagle Protection Act (BGEPA) of 1940 (16 U.S.C. §§ 668–668d) and the Migratory Bird Treaty Act of 1918 (MBTA) (16 U.S.C. §§ 703–712) to ensure that appropriate conservation measures and BMPs would be incorporated into the project. To the extent possible, construction activities would avoid specific habitat locations onsite if there are known nesting birds and avoid nesting seasons. Pre-construction nesting surveys for migratory birds and raptors would be conducted and if evidence of nesting is found, the FL TIG would coordinate with the USFWS to develop and implement appropriate conservation measures. At a minimum, trees/shrubs with active nests would be flagged and avoided. To avoid or minimize impacts to migratory birds from increased human activity, the boardwalk would divert and concentrate recreational users away from any important nesting, foraging, or rookery locations. Additionally, signage would be installed along trails and boardwalks to provide users information on sensitive species in the area, if applicable, and actions to take to avoid or minimize impacts to sensitive species. Foraging and resting birds may temporarily be displaced during construction or recreation activities. Bird roosting would not be affected because construction activities and most human use would occur during daylight hours.

The FL TIG has begun coordinating with the relevant regulatory agencies related to potential impacts to protected species and habitats. Conservation measures recommended during formal consultation would be incorporated into final project design and implementation to avoid and/or minimize impacts to protected species and habitats. Specific conservation measures would also be implemented during construction to avoid and minimize disruption and overall impacts to protected species. Below is a list of potential protected species at Carpenter Creek, effects from the project activities, and potential conservation measures.

Eastern Indigo Snake: While the Eastern indigo snake could inhabit the site, none are known to inhabit the site. Potential impacts include dust, noise, and habitat destruction. This species is mobile and would likely exit the area during construction. BMPs would be used to minimize impacts to snakes. The USFWS Standard Protection Measures for the Eastern Indigo Snake would be implemented if any evidence of the Eastern Indigo Snake is found in the action area (USFWS 2013). It frequently co-inhabits gopher

tortoise burrows, thus, if encountered, the Eastern indigo snake would be subject to the same removal and relocation efforts. Thus, while this project may affect the Eastern indigo snake, it is not likely to adversely affect this species.

Gopher Tortoise: Under Florida state law, gopher tortoises must be relocated prior to land clearing or development activities. If gopher tortoises are found in the area affected by the construction of the parking lot, boardwalk, or passive recreation area, they would need to be relocated. Improvements that destroy gopher tortoise habitat would directly impact these species, however, the proposed improvements would avoid impacts to burrows, the tortoise, and its habitat, where feasible. If a gopher tortoise were found in the action area, it would be relocated as required by Florida state law. If suitable habitat is present, a survey would be conducted to identify any possible gopher tortoise burrows. If any burrows are encountered in construction and staging areas, they would need to be relocated (after consulting with USFWS). As such, no direct or indirect adverse effects on the gopher tortoise are anticipated.

Short- as well as long-term adverse impacts to biological resources would occur onsite as a result of construction and site preparation activities. Long-term impacts associated with habitat and wildlife disturbance from visitors on the site are anticipated to be minor.

In summary, because the construction activities would be localized to the site and habitat fragmentation would be limited, impacts from the project to biological resources would be minor, adverse, short- and long-term.

Socioeconomic Resources

During the construction phase of this project, construction equipment and operations would likely be located in previously disturbed areas and parking lots. To the extent required, the use of construction equipment, including equipment used for the movement and placement of materials and barriers enacted to protect public safety would result in some minor to moderate short-term adverse impacts on aesthetics and visual quality. These impacts result from the presence of equipment, barriers and construction-related dust and emissions. During the construction period, visible impedances would detract from the natural landscape and create visual contrast for observers. The project is likely to add an additional burden on the public utilities due to increased use over the long-term.

Over the long-term the additional amenities including the boardwalk, parking area, educational signage, and kayak launch, would provide greater access to the natural resources in the area, enhance recreational opportunities, and create a more developed appearance. The new park would be managed by Escambia County Natural Resources Management Division.

In summary, the project is anticipated to result in short- and long-term minor to moderate adverse impacts to utilities and aesthetics and visual resources. However, the improvements would provide benefits and amenities to park visitors over the long-term.

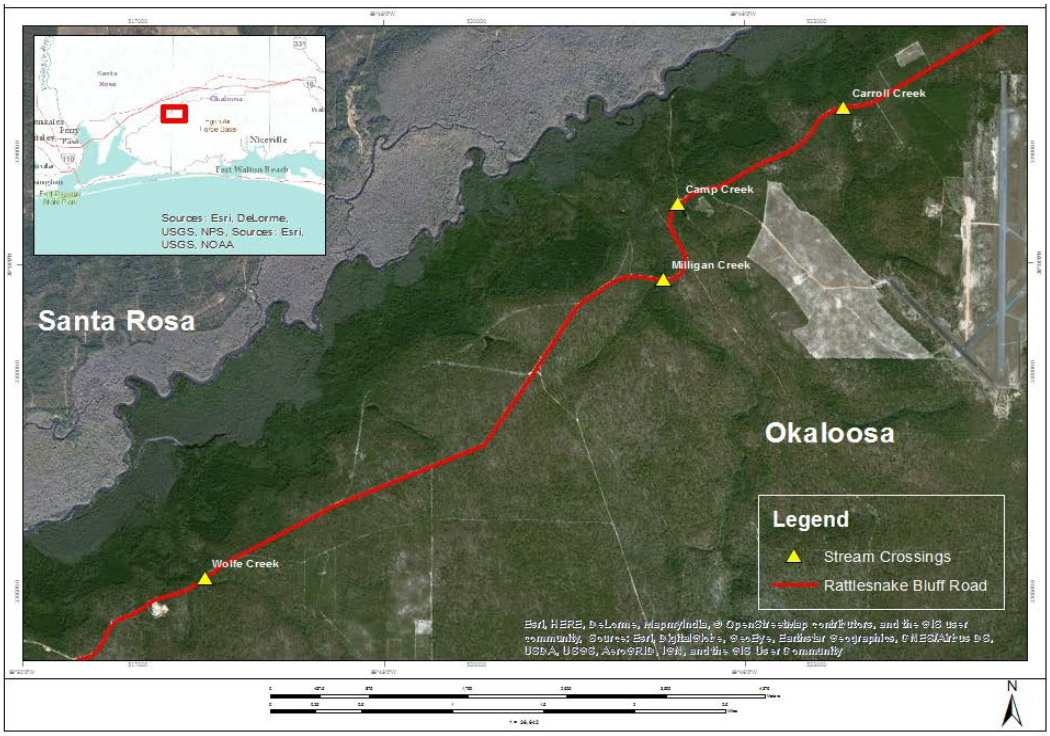
4.6.4 WQ3, Rattlesnake Bluff Road and Riverbank Restoration (Preferred)

Under WQ3, Rattlesnake Bluff Road and Riverbank Restoration, Rattlesnake Bluff Road would be upgraded to mitigate the negative impacts of excessive sedimentation to water quality, habitats and ecological resources of the Yellow River basin on Rattlesnake Bluff Road, including road stabilization and culvert replacement at four to six priority impaired sites/stream crossings. Reducing sedimentation would improve water quality and also benefit estuarine-dependent water column resources, oysters, and SAV, and mitigate chronic ecosystem threats such as habitat degradation and impacts to recreational use. Refurbishment or replacement of up to nine small bridges or culverts would occur where Rattlesnake Bluff Road crosses designated priority stream crossings in the watershed based on previous analyses (Herrington et al. 2010, USFWS 2005 and 2006). Sites would be restored by road grading, stabilizing, and revegetating the breached bank to floodplain level, and by closing, grading, filling, and seeding the unpaved areas for long-term sediment stabilization. Four priority stream crossings have currently been selected for restoration activities (Figure 4-10). Two additional sites would be chosen at the completion of re-assessment monitoring. All activities would occur on Eglin AFB lands.

4.6.4.1 Affected Environment

The area of analysis for the proposed Rattlesnake Bluff Road and Riverbank Restoration is a corridor that includes 250 feet on each side of Range Roads (RR) 257 and 211, from Camp Rudder at Eglin AFB (just south of the RR 257 and 211 intersection) to the intersection of RR 211 and SR 85. The project area is on the south side of the Yellow River and follows the river northeast to its confluence with the Shoal River, and then east along the Shoal River to SR 85. The EA for the *Access Improvement Initiative 6th Ranger Training Battalion Camp James E. Rudder Eglin Air Force Base, Florida* (Trinity 2014) contains extensive information about the physical and biological environment that would be affected by this project. That information is incorporated by reference herein.

Figure 4-10 Locations of project along Rattlesnake Bluff Road in Okaloosa County



Physical Resources

The project area ranges in elevation from approximately 20 feet above MSL in the vicinity of the Yellow River to approximately 135 feet above MSL in the uplands proximate to the rivers. The entire corridor includes approximately 749.5 acres. Upland soils comprise approximately 624 acres (83.2 percent) of the corridor, about 74 percent (554 acres) of extremely well drained and highly permeable deposits of sands of Lakeland sands. Remaining upland soils include about 70 acres (10 percent) of Foxworth and Troup sands in upland areas and along the banks of the Yellow River and its tributaries in the project corridor. Hydric soils make up a total of about 124.8 acres (17 percent) of the project corridor. Dorovan muck soils characterize the lowest topographic areas in and outside the project corridor and are frequently flooded and associated with the rivers, tributaries, and ponds.

No geologic hazards (e.g., faults or fault zones), have been identified in the vicinity of the project corridor. The depth to the unconfined groundwater table is variable, but normally exceeds 10 feet below land surface (bls) and may be in excess of 50 feet bls on ridges and knolls. The shallow nature of the Sand and Gravel aquifer make it vulnerable to potential contamination from polluted stormwater runoff. Because of the present and historic military presence, the potential for contamination of soils and water was evaluated for the project area. Following evaluations of potential contamination of the project and adjacent areas, no suspected contamination sites or known contamination sites have been identified within the project corridor. Details of surveys are included in the EA for the *Access Improvement Initiative 6th Ranger Training Battalion Camp James E. Rudder Eglin Air Force Base, Florida* (Trinity 2014).

Rattlesnake Bluff Road intercepts streams that drain directly into the Yellow River basin and are impaired primarily due to undersized and improperly positioned culverts and bare soils, ditches, and outlets. The road is one of 88 highest priority unpaved roads for restoration by TNC (Herrington 2014). The project corridor crosses several creeks that are presently impacted due to sedimentation from the existing crossings associated with the unpaved RR 211/257. The Yellow River is designated as impaired for DO, turbidity, and mercury and has a TMDL for the designated segment upstream of its confluence with the Shoal River. The Shoal River upstream of its confluence with the Yellow River is impaired for bacteria. The project corridor crosses these designated segments for both the Yellow and Shoal rivers. Water quality priorities identified in the Pensacola Bay SWIM Plan (NWFWMD 2017b) include restoration of water quality in impaired waters, reducing sedimentation and turbidity from unpaved roads and other sources, and restoration of wetland and stream hydrology.

Biological Resources

Habitats along the project corridor are almost exclusively (98 percent) undeveloped (Table 4-15), consisting of both uplands (87 percent) and wetlands (11 percent). Coniferous (pine) forests make up 398.50 acres (53 percent) of the project area and are the largest single group of undeveloped uplands in the corridor. These habitats are important to numerous species of fish and wildlife. Upland habitats also include longleaf pine, sandhills, mesic flatwoods, and wet flatwoods communities. Long leaf pinelands, wet flatwoods, sandhills, xeric hammocks, and seepage slopes and streams, and wet prairie occur in and/or proximate to the project corridor. There was a 90 percent decline in Florida longleaf pinelands in the state from 1936 to 1995, due to the conversion to pine plantations, development, and agriculture, and much of the panhandle is managed for silviculture. Silviculture (planted pine) includes approximately 118 acres of the project corridor in various stages of growth (plantations and regeneration areas). An additional 114.41 acres of dry prairie, xeric oaks, and hardwood/pine forest mixes occur in the project corridor.

Table 4-15 Acres of habitat in Rattlesnake Bluff Road and River Restoration project area

FLUCCS Code	Acres	Percent of Total Area
Developed - Total	**14.55**	**1.59**
Urban and Built-Up	**4.69**	**0.63**
1860: Recreational	3.45	0.46
1130: Residential, Low Density (Less Than Two Units/ Acre)	1.24	0.17
Transportation, Communication and Utilities	**7.21**	**0.84**
8110: Transportation and Utilities, Airports	7.21	0.84
Barren Land	**2.64**	**0.35**
7410: Disturbed Land	2.64	0.35
Undeveloped - Total	**734.00**	**98.06**
Uplands - rangeland	**19.33**	**2.58**
3100: Herbaceous (Dry Prairie)	12.13	1.62
3300: Mixed Rangeland	0.64	0.09
3200: Shrub and Brushland	6.56	0.88
Uplands - Forests	**630.84**	**84.16**
4410: Tree Plantations	117.93	15.73
4100: Upland Coniferous Forests	398.50	53.17
4210: Upland Hardwood Forests	114.41	15.26
Wetlands	**83.39**	**11.13**
6400: Vegetated Non-Forested Wetlands	18.11	2.42
6250: Wetland Coniferous Forests	27.08	3.61
6300: Wetland Forested Mixed	37.23	4.97
6110: Wetland Hardwood Forests	0.98	0.13
Water	**1.44**	**0.19**
5300: Reservoirs	1.44	0.19
Grand Total	**749.54**	**100.00**
Note: values may not add up due to rounding.		

Wetlands in the project corridor and in the region were harvested for the lumber and replanted with slash pine in the 1950s and continue to be impacted by road construction and associated dredging and filling activities and erosion. A total of 11 federally listed mussels, amphibians, reptiles, and birds, as identified by IPaC and FNAI potentially occur in the project area (Table 4-16; USFWS 2018a, FNAI 2018). Potentially occurring state and federally listed species for the watershed are provided in Appendix E. Streams in the project corridor drain to Gulf sturgeon and mussel critical habitat. The mainstem of the Yellow River and its tributaries are within the range of eight fishes listed among Florida's Rare and Imperiled Species such as the Gulf sturgeon, alligator gar, bluenose shiner, and speckled darter.

Disturbances in both uplands and wetlands that occur due to road construction and development provide gaps that are quickly colonized by invasive species that may compete with native fish and wildlife species for light, food, and habitat. The Six Rivers Cooperative Invasive Species Management Areas (CISMAs) is a cooperative effort between TNC and Eglin AFB to work with military bases in Florida

to reduce re-infestation of invasive species at six Florida military bases and includes programs for monitoring and managing invasive species on military bases.

Table 4-16 Federally listed species potentially occurring in the Rattlesnake Bluff Road and River Restoration project area

Common Name	Scientific Name	Habitat	Status	Likelihood
Narrow pigtoe	*Fusconaia escambia*	Riverine: big river, creek, low gradient, medium river, pool, riffle	T/CH	Unlikely in tributaries
Fuzzy pigtoe	*Pleurobema strodeanum*	Riverine: medium-sized creeks to small rivers; various substrates; slow to moderate currents	T/CH	Unlikely in tributaries
Choctaw bean	*Villosa choctawensis*	Riverine: large creeks and rivers with moderate current over sand to silty-sand substrates	E/CH	Unlikely in tributaries
Southern sandshell	*Hamiota australis*	Riverine: clear small creeks and rivers with slow to moderate current in sandy or mixtures of sand and fine gravel substrate with woody debris	T/CH	Unlikely in tributaries
Tapered pigtoe	*Fusconaia burkei*	Riverine: medium-sized creeks to large rivers, in sand and gravel substrata, occasionally in silty sands, in slow to moderate currents, occasionally in floodplain lakes.	T/CH	Unlikely in tributaries
Gulf sturgeon	*Acipenser oxyrinchus desotoi*	Estuarine: various Marine: various habitats Riverine: alluvial and blackwater streams	T/CH	Main channel of Yellow River
Reticulated flatwoods salamander	*Ambystoma bishopi*	Terrestrial: slash and longleaf pine flatwoods that have a wiregrass floor and scattered wetlands	E	Very unlikely
Eastern indigo snake	*Drymarchon couperi*	Estuarine: tidal swamp Palustrine: hydric hammock, wet flatwoods Terrestrial: mesic flatwoods, upland pine forest, sandhills, scrub, scrubby flatwoods, rockland hammock, ruderal	T	Likely
Gopher tortoise	*Gopherus polyphemus*	Terrestrial: sandhills, scrub, scrubby flatwoods, xeric hammocks, coastal strand, ruderal	C	Potential
Red-cockaded woodpecker	*Picoides borealis*	Terrestrial: mature pine forests	E	Likely to forage within 1km

Note: Species determined to be "Unlikely" to be found in the action area are not addressed further in this analysis. E=Endangered, T=Threatened, SAT=Similarity of Appearance (Threatened), C=Candidate, SSC=Species of Special Concern, CH=Critical Habitat.

Socioeconomic Resources

The project site for the proposed Rattlesnake Bluff Road and Riverbank Restoration is a corridor that includes 250 feet on each side of Range Roads (RR) 257 and 211, from Camp Rudder at Eglin AFB (just south of the RR 257 and 211 intersections) to the intersection of RR 211 and SR 85. The area of the road considered to be in the project site is located predominantly in Okaloosa County.

The overall population of Eglin AFB reported by the U.S. Census Bureau is 5,503 individuals, with a median age of 21, in 2016. Approximately 64 percent of the individuals are white, and 13 percent are black. Remaining individuals are Native American, Asian, Pacific Islander, and/or of mixed race. The poverty rate is low, at 8.6 percent, compared with Okaloosa County (12 percent) and much lower when

compared with the rest of the state (16.1 percent). More than 98 percent of individuals are high school graduates or greater, and nearly 30 percent have a bachelor's degree or higher.

4.6.4.2 Environmental Consequences

Only those resource areas for which potential impacts are expected are discussed in detail in for this alternative. The FL TIG analyzed the following resources in more detail below:

- **Physical Resources** – Geology and Substrates, Hydrology and Water Quality
- **Biological Resources** – Habitats, Wildlife Species, Marine and Estuarine Fauna, Protected Species
- **Socioeconomic Resources** – Socioeconomics, Land and Marine Management, Tourism and Recreational Use, Aesthetics and Visual Resources.

The EA for the Access Improvement Initiative 6th Ranger Training Battalion Camp James E. Rudder Eglin Air Force Base, Florida (Trinity 2014) contains extensive information about environmental consequences of improved stormwater control at the base. That information is incorporated by reference herein.

Physical Resources

Activities associated with the project, including: road paving with asphalt, stormwater pond construction, and stormwater infrastructure for in the approximately 400 square foot construction work areas at stream crossings would result in short-term, adverse impacts to hydrology and water quality because construction of the paved road would result in soil disturbance and earth compaction during construction that would increase runoff and decrease infiltration of water into soils, as well as potential contaminants associated with fuel and asphalt. Similarly, the proposed road and stream crossings would increase the area of impervious surfaces, also increasing runoff and decreasing water infiltration into soils. The level of adverse impacts would be directly related to the intensity and type of development if it were to occur. Disturbance to roads would be detectable, but localized, and no long-term changes to geology (e.g., bedrock removal) are anticipated. Removal and replacement of existing culverts would disturb stream banks, stream beds, and adjacent upland and wetland ground surface. Undersized culverts may alter hydrology and sediment deposition volumes and patterns. Vehicle traffic may result ground surface disturbance and/or soil compaction and disturbance of work and staging areas. Appropriate construction management activities would be implemented to ensure properly sized culverts, suitable road materials and placement, road stabilization via planting, and subsequent reductions in erosion and sediment runoff.

However, graded unpaved roads are the primary source of sediment in runoff in the watershed and paving the road would reduce the amount of sediment transported from the dirt road that would otherwise be transported into the ravines and streams in the project areas. Therefore, the project would greatly reduce or eliminate soil/sediment migration from the roadway and swales into surface waters and wetlands and result in substantial long-term benefits to the water resources. During construction BMPs and required stormwater and erosion control measures would be implemented, so there would be no adverse impacts to drainage basin, floodplain, surface water, or ground water resources. The Recommended Practices Manual: a guideline for maintenance, developed for and by the

Choctawhatchee, Pea, and Yellow Rivers Watershed Management Authority (CPYRWMA), presents practices to enhance stability and maintenance of unpaved roadways to reduce sedimentation and improve water quality of in the Choctawhatchee, Pea, and Yellow river watersheds and is referenced here (EPA 2010).

Hot asphalt may be used as paving material and is considered a hazardous material (a Class 3 Flammable Liquid) by 49 CFR 172.101. Any hot asphalt generated or used would be managed in accordance with all local, state, and federal requirements. Consequently, there are no reasonable expectations that the project would generate or require the use of any other hazardous materials or wastes. Potential discovery of unanticipated UXO or DMM when performing construction within a test range required coordination through Eglin Range Safety and Eglin AFB Explosive Ordnance Disposal (EOD) Unit, who would determine whether UXO Survey or Construction support would be required. In addition, if any evidence of contamination, such as suspect odors, stained soil, buried foreign material, or abnormal groundwater odors is discovered, construction would cease and FDEP would be notified.

No long-term adverse impacts are anticipated. Water quality would be improved as a result of stabilized roads and stream banks and subsequently reduced erosion and sediment runoff; greater water clarity due to reduced sediment loads; improved hydrology and hydrologic function over a larger area due to replaced culverts and restored channel flows; improved percolation of surface water to groundwater due to restored and planted road sides and river banks; improved stream bottom conditions due to reduced erosion and improved flows; and reduced sediment loads to downstream waterbodies.

Eglin AFB would coordinate all applicable permits in accordance with the FAC. Applicable permitting requirements would be satisfied in accordance with Chapter 62-330, FAC, and National Pollutant Discharge Elimination System (NPDES). Wetland mitigation needs would be assessed during the Florida Environmental Resource Permit (ERP), USACE Sect 404 Permit, and the Application for Works in the Waters of Florida processes. The project would increase the potential for impact from the increased rate and volume of stormwater runoff, due to an increase in impervious surface area. To avoid these impacts, proper siting, construction techniques, erosion control measures, and engineering design would be incorporated into project development. During construction, BMPs and required stormwater and erosion control measures would be implemented to avoid adverse impacts to drainage basins, floodplains, surface waters, or ground water resources. An NPDES stormwater construction permit would be obtained prior to construction activities and permit requirements would be implemented accordingly. Roadway improvement activities would meet federal and state regulations for increased stormwater management, creating long-term benefits to water resources. Construction and stormwater permits would include an Erosion, Sedimentation, and Pollution Control Plan which would require the implementation of site-specific management actions and BMPs (BMPs), such as planting vegetation, employing silt fencing, sand bags, rock bags, sediment traps, sediment basins, synthetic bales, and floating and staked turbidity barriers. These measures would help ensure that right-of-way construction activities do not create erosion, sedimentation, or siltation that would negatively impact individual species and their habitat.

In summary, the project would result in short-term minor adverse impacts to physical resources, and also long-term benefits.

Biological Resources

Short- and long-term, adverse impacts to habitats, fish and wildlife, and listed species would occur due to disturbance and or elimination of habitat due to construction of the paved road and new stream crossings that would disturb and/or compact soils during construction, resulting in increased runoff and erosion, reduced soil infiltration, and increased delivery of NPS pollutants to the streams. Removal and replacement of existing culverts would disturb stream banks, stream beds, and adjacent upland and wetland ground surface. Long-term and permanent loss of habitat and resulting adverse impacts to listed species would occur due to the permanent nature of the development and associated impervious surfaces, and subsequent use by visitors. The level of adverse impacts would be directly related to the intensity and type of development if it were to occur.

Road improvement activities may have an indirect localized effect on native terrestrial, wetland, and aquatic wildlife species. Most animal species would move permanently or temporarily into proximate and/or adjacent habitat, thereby avoiding impacts of construction activities such ground disturbance, vegetation and soils removal, stream disturbance, construction generated stormwater discharge, and temporary and permanent habitat loss. Eglin AFB Natural Resources Section coordinate informal consultation with the USFWS under Section 7 of the ESA in regard to potential impacts to red-cockaded woodpecker, eastern indigo snake, Gulf sturgeon critical habitat, and freshwater mussels. The Shoal and Yellow rivers are Critical Habitat for Gulf sturgeon and listed mussel species. Mussels do not occur in the proposed corridor but streams in the project corridor drain to the Shoal and Yellow rivers. No impacts to listed species in the project area are expected. Mussels and flatwoods salamanders are unlikely to occur in the ravines in the project. The upland species would likely move outside the project corridor during construction and return. Permits for potential gopher tortoise relocation and consultation with USFWS respect to RCWs, eastern indigo snake, and black bear consultation, would be undertaken.

Short term and temporary adverse impacts to biological resources such as vegetation, fish, and wildlife are anticipated as a result of the project and may range from major (loss of habitat) to negligible. The project may result in short-term and temporary impacts to downstream waters and, therefore, vegetation and wildlife associated with the streams and rivers. Restoration activities may temporarily interrupt access across the streams by fauna such as salamanders and may result in direct but unintended deaths of smaller animals by machinery. Local migration paths may be interrupted during construction. Increased erosion and sediment loads during construction may adversely impact aquatic, wetland, and upland wildlife, including birds, via disturbance, physical barriers, and habitat loss. BMPs would be implemented, as described for water quality, and therefore are expected to have negligible to minor adverse impacts on mussels, fish, and other wildlife, and vegetation. Terrestrial fauna would move from the construction areas.

Mussel species are impacted by habitat loss and degradation in the basin as a result of impoundments, pollution, sedimentation, channel dredging, altered flow regimes, and development activities are the primary reason for their decline. Activities that affect their specific host fish also impact the mussels,

since the host fish is critical to the mussel's reproduction and dispersal Previous studies have demonstrated that standard culvert designs placed in streams with slopes exceeding 5 percent may act as trout dispersal barriers in the southeastern U.S. and should be avoided during new road construction (Poplar-Jeffers et al. 2009). Although culverts represent a loss of stream habitat for mussels (USFWS 2017), removing or improving existing culverts can improve fish passage and therefore availability of fish hosts for mussel dispersal. Features at culverts that may be fish passage barriers include high water velocities that exceed fish swimming speeds, excessive turbulence at contracted inlets, elevation drops at either the inlet or outlet, low flows without sufficient depth needed for fish to swim, lack of natural light, and physical obstructions such as weirs, debris, and sediment (Gardner 2006).

Long-term benefits are anticipated due to reductions in erosion and, therefore, the sediment loading to streams in and downstream of the project area, resulting in restored stream channel water capacity, reducing flooding, and restored aquatic and riparian habitat. Restored stream channels would also remove barriers to fish passage and improve the function of the stream as a corridor for wildlife.

In summary, the project would result in short- and long-term minor adverse impacts and long-term benefits to biological resources.

Socioeconomic Resources

Temporary construction jobs would likely be available during construction of the proposed road and stream crossings, resulting in short-term benefits to the local economy. The project is not expected to have any adverse impacts on employment, housing, Eglin AFB, or Okaloosa County services. Utilities may require relocation under the proposed action and, if so, DOD and the construction contractor would coordinate with on-base and local utility service providers during construction to ensure continued service, therefore decreases in the level of service to surrounding areas are not anticipated. Conversely, the implementation of the proposed action may provide opportunity to achieve necessary installation or upgrades of utilities during the time of road construction. Utility easements would require completion of an Environmental Baseline Survey (EBS) prior to Eglin granting an easement request. It is recognized that fiber optic communication lines (high-speed internet/communications) are very likely to be placed along the route.

In summary, the project is anticipated to result in short-term negligible adverse impacts due to potential relocation of utilities and short-term benefits.

4.6.5 NR1, Pensacola Bay and Perdido River Watersheds - Nutrient Reduction (Preferred)

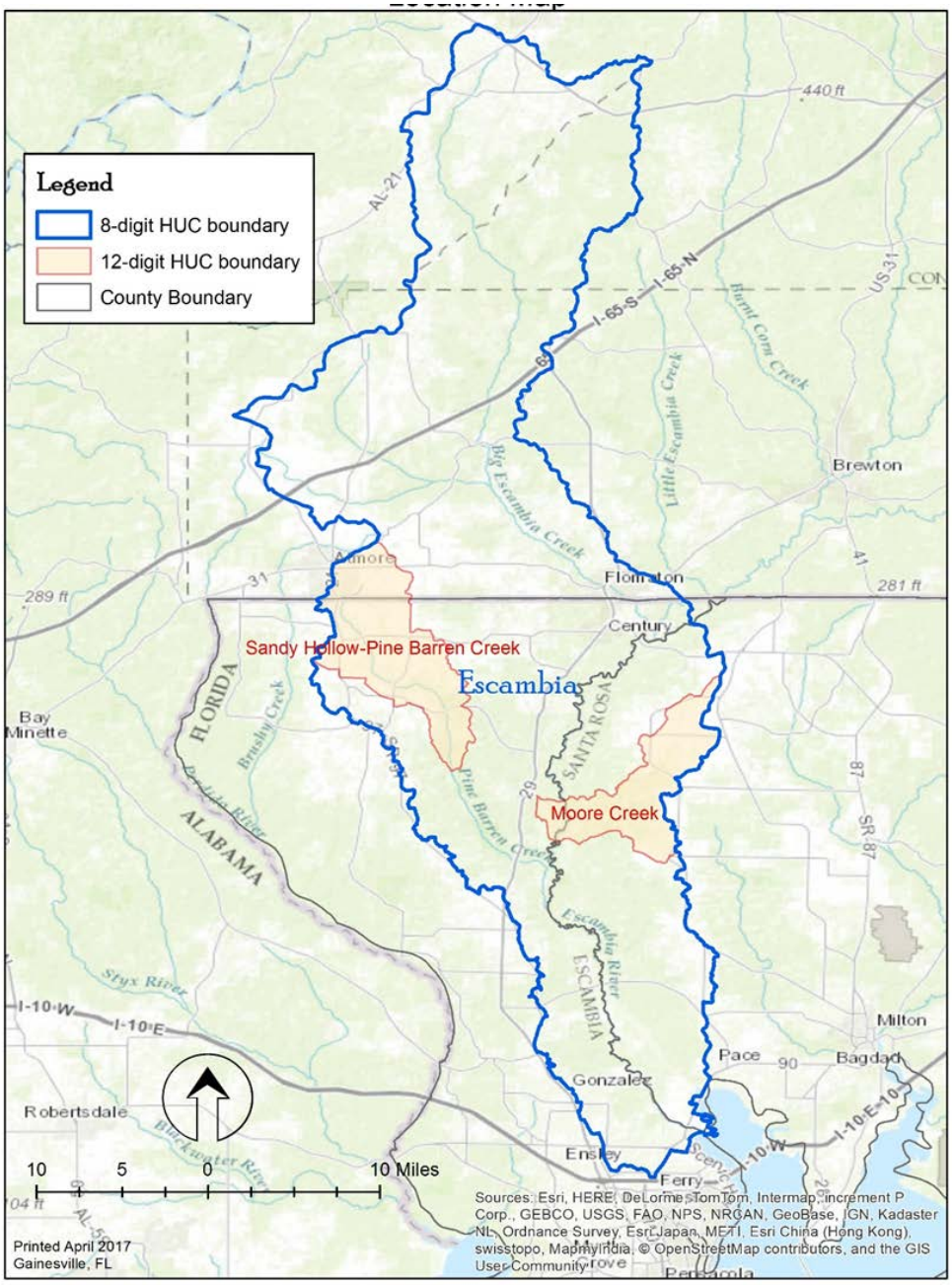
The goals of the project are to 1) improve water quality by reducing nutrient loads to coastal watersheds 2) develop conservation plans on agricultural land to address nutrient and sediment runoff; and 3) implement conservation practices identified in the conservation plans. The project would be implemented by USDA in the Pensacola and Perdido Bay watersheds in two HUC12 watersheds: Sandy Hollow-Pine Barren Creek and Moore Creek (Figure 4-11).

USDA and its conservation partners would help voluntarily participating landowners by developing conservation plans that identify natural resource concerns and conservation practices landowners can implement to reduce nutrient and sediment runoff. The conservation planning and implementation would be completed independently but consistently among the two watersheds for addressing nutrient and sediment sources in small watersheds with the goal of making and observing a measurable impact. This would be accomplished through technical and financial assistance to willing private and public landowners. Eligible landowners include owners of undeveloped forested upland headwaters, farms and ranches. This project would implement standard best practices of USEPA and USDA as relevant. This alternative would include riparian and wetland restoration and storm water control on primarily agricultural and forested lands. Practices expected to be implemented as part of this project (and commonly applied by USEPA and USDA) potentially include, but are not limited to, the following activities:

- Riparian Forest Buffer
- Filter Strip
- Riparian Herbaceous Cover
- Water and Sediment Control Basin
- Stormwater Runoff Control
- Critical Area Planting
- Access Control
- Grassed Waterway
- Urban Forestry
- Bioswale

Project management and oversight, planning, implementation, and monitoring would be a partnership effort between USDA, EPA, and the state water quality agencies. USDA and EPA would use its existing staff, authorities, and expertise to work with willing partners to implement conservation practices on their lands. There are four phases: outreach to potential partners, selection of priority parcels, site-specific conservation planning and implementation, and post-implementation monitoring. Time to completion is three years from project initiation. Additional details on the project are provided in Chapter 2 (Section 2.5.2).

Figure 4-11 Pensacola Bay and Perdido River Watersheds-Nutrient Reduction



4.6.5.1 Affected Environment

Physical Resources

Please refer to section 4.6.1.1, Physical Resources of Pensacola Bay Watershed.

Biological Resources

Summarized information is provided below. Please refer to section 4.6.1.2, Biological Resources of Pensacola Bay Watershed for additional details.

The Pensacola Bay and Perdido River Watershed contains primarily undeveloped lands. In summary, agricultural lands account for approximately 36 percent of the watershed and uplands account for 38.5 percent of the watershed (Table 4-17). Combined, these three land types make up approximately 75 percent of the watershed.

Table 4-17 Acres of habitat in the Pensacola Bay and Perdido River Watersheds - Nutrient Reduction project area

FLUCCS Code	Acres	Percent of Total Area
Developed - Total	**19,472.38**	**42.23**
Agriculture	**16,698.02**	**36.22**
2100 - 2200: Cropland and Pastureland, Row and Field Crops, Tree Crops	16,225.04	35.19
2310: Cattle Feeding Operations	10.82	0.02
2400 - 2600: Nurseries, Specialty Farms, Other Open Land (Rural and Fallow)	462.16	1.00
Residential and Commercial	**2,405.41**	**5.21**
1100: Low Density Residential	2,095.16	4.54
1400 - 1900: Commercial and Services, Industrial, Institutional, Open Land (Urban)	310.24	0.67
Transportation, Communication, and Utilities	**296.38**	**0.64**
8100 – 8300: Transportation, Communication, Utilities	296.38	0.64
Disturbed and Barren Land	**72.58**	**0.16**
7200 – 7500: Disturbed and Barren Lands	72.58	0.16
Undeveloped - Total	**26,635.06**	**57.77**
Upland Forest	**17,751.56**	**38.50**
4100: Upland Coniferous Forests	960.49	2.08
4200: Upland Hardwood Forests	1,866.47	4.05
4340: Hardwood Coniferous - Mixed	2,290.46	4.97
4410: Coniferous Plantations	8,277.15	17.95
4430: Forest Regeneration Areas	4,356.99	9.45
Wetlands	**7,684.54**	**16.67**
6100: Wetland Hardwood Forests	3,227.67	7.00
6210: Cypress	555.92	1.21
6250: Hydric Pine Flatwoods	266.95	0.58
6300: Wetland Forested Mixed	3,196.06	6.93
6400 – 6500: Herbaceous Marsh and Prairie, Intermittent Ponds	437.93	0.95
Rangeland	**865.40**	**1.88**
3100: Herbaceous (Dry Prairie)	375.96	0.82
3200: Shrub and Brushland	346.76	0.75
3300: Mixed Upland Nonforested	142.67	0.31
Water	**333.56**	**0.72**
5100: Streams and Waterways	124.63	0.27

FLUCCS Code	Acres	Percent of Total Area
5200: Lakes	29.31	0.06
5300: Reservoirs	171.07	0.37
5600: Slough Waters	8.56	0.02
Grand Total	**46,107.44**	**100**
Note: values may not add up due to rounding.		

Federally listed species, as identified by IPaC and FNAI, potentially occurring in the project area are listed in Table 4-18 (USFWS 2018a, FNAI 2018). State and federally listed species are listed for the watershed in Appendix E.

Table 4-18 Federally listed species potentially occurring in the Pensacola Bay and Perdido River Watersheds - Nutrient Reduction project area

Common Name	Scientific Name	Habitat	Status	Likelihood
Tapered pigtoe	*Fusconaia burkei*	Riverine: medium-sized creeks to large rivers, in sand and gravel substrata, occasionally in silty sands, in slow to moderate currents, occasionally in floodplain lakes.	T*(CH)	Potential
Narrow pigtoe	*Fusconaia escambia*	Riverine: big river, creek, low gradient, medium river, pool, riffle	T*(CH)	Potential
Round ebonyshell	*Fusconaia rotulata*	Riverine: big river, endemic form restricted to the Escambia/Conecuh drainage in Florida and Alabama, no known occurrences in tributaries	E*(CH)	Potential
Southern sandshell	*Hamiota australis*	Riverine: clear small creeks and rivers with slow to moderate current in sandy or mixtures of sand and fine gravel substrate with woody debris	T*(CH)	Potential
Fuzzy pigtoe	*Pleurobema strodeanum*	Riverine: medium-sized creeks to small rivers; various substrates; slow to moderate currents	T*CH)	Potential
Southern kidneyshell	*Ptychobranchus jonesi*	Riverine: endemic to Choctawhatchee River drainage in Alabama and Florida	T*(CH)	Potential
Choctaw bean	*Villosa choctawensis*	Riverine: large creeks and rivers with moderate current over sand to silty-sand substrates	E*(CH)	Potential
Gulf sturgeon	*Acipenser oxyrinchus desotoi*	Estuarine: various Marine: various habitats Riverine: alluvial and blackwater streams	T(CH)	Main channel of Yellow River
Reticulated flatwoods salamander	*Ambystoma bishopi*	Terrestrial: slash and longleaf pine flatwoods that have a wiregrass floor and scattered wetlands	E	Potential
Eastern indigo snake	*Drymarchon couperi*	Estuarine: tidal swamp Palustrine: hydric hammock, wet flatwoods Terrestrial: mesic flatwoods, upland pine forest, sandhills, scrub, scrubby flatwoods, rockland hammock, ruderal	T	Likely
Gopher tortoise	*Gopherus polyphemus*	Terrestrial: sandhills, scrub, scrubby flatwoods, xeric hammocks, coastal strand, ruderal	C	Likely
Wood Stork	*Mycteria americana*	Estuarine: marshes Lacustrine: floodplain lakes, marshes (feeding); Palustrine: marshes, swamps,	E*	Potential to be present

Common Name	Scientific Name	Habitat	Status	Likelihood
		roadside ditches		foraging
Red-cockaded woodpecker	*Picoides borealis*	Terrestrial: mature pine forests	E*	Potential
Note: Species determined to be "Unlikely" to be found in the action area are not addressed further in this analysis. E=Endangered, T=Threatened, SAT=Similarity of Appearance (Threatened), C=Candidate, SSC=Species of Special Concern, CH=Critical Habitat.				

4.6.5.2 Resources Analyzed in Detail for this Alternative

Table 4-19 identifies how potentially affected resources are analyzed in this RP/EA for this alternative. In particular, it identifies whether resources were addressed in Section 4.2 (Resources Not Analyzed in Detail in this RP/EA), as well as resources that do not require additional analysis for this alternative because they are unaffected by it, or the impacts would be so minor that a more detailed NEPA analysis is not needed. It also identifies resources that will be analyzed in detail.

Table 4-19 NEPA Assessment of Resources for this Alternative

Resource	Location of Analysis in Chapter 4
Physical Resources	
Geology and Substrates	Any local impacts on geology are expected to be short- to long-term, minor, such as soil movement related to the implementation of BMPs. Mitigation measures to minimize impacts on geology and substrates could include employing standard BMPs for construction to reduce erosion and loss of sediments. Long-term effects should be negligible or beneficial. Therefore, this resource area was not carried forward for detailed analysis.
Hydrology and Water Quality	Section 4.6.5.3
Air Quality and Greenhouse Gas Emissions	Section 4.2
Noise	Section 4.2
Biological Resources	
Habitats	Section 4.6.5.3
Wildlife Species (including birds)	Section 4.6.5.3
Marine and Estuarine Fauna (fish, shellfish, benthic organisms)	Section 4.6.5.3
Protected Species	Section 4.6.5.3
Socioeconomic Resources	
Socioeconomics	Activities would be undertaken on private lands; therefore, impacts are not expected to substantively alter social or economic conditions and would not disproportionately affect minority and low-income populations. Payments to farmers would attempt to compensate for adverse effects to farming activities.
Environmental Justice	Section 4.2
Cultural Resources	Section 4.2

Resource	Location of Analysis in Chapter 4
Infrastructure	Project activities would not affect public services or utilities.
Land and Marine Management	Project activities would not require a variance or zoning change or an amendment to a land use, area comprehensive, or management plan.
Tourism and Recreational Use	This project is not expected to affect tourism or recreational use.
Fisheries and Aquaculture	Section 4.2
Marine Transportation	Section 4.2
Aesthetics and Visual Resources	This project is not expected to affect aesthetics or visual resources.
Public Health and Safety, Including Flood and Shoreline Protection	Section 4.2
Note: Resource does not require additional analysis for this alternative because it is unaffected by the alternative, or the impacts would be so minor that a more detailed NEPA analysis is not needed.	

4.6.5.3 Environmental Consequences

Only those resource areas for which potential impacts are expected are discussed in detail in this draft RP/EA. The FL TIG analyzed the following resources in more detail below:

- **Physical Resources:** Hydrology and Water Quality
- **Biological Resources:** Habitats, Wildlife Species, Protected Species, Marine and Estuarine Fauna

USDA-NRCS would implement each Nutrient Reduction project (if selected) in various watersheds in Florida for the purpose of improving water quality by implementing CPs to reduce nutrient and sediment runoff. USDA-NRCS and its conservation partners would help voluntarily participating landowners by developing CPs that identify natural resource concerns and practices the landowner could implement. Since implementation of this alternative requires the voluntary participation of landowners, the precise location of project actions is unknown at this time. As such, additional compliance review would be conducted after a project site is identified. USDA-NRCS would conduct site specific environmental evaluations ahead of project implementation to ensure that the planned restoration activities for the proposed project location does not exceed the environmental impact thresholds detailed in the RP/EA. This covers all pertinent state and federal environmental regulations, including ESA and NHPA. The process would include the following considerations:

1. **USDA NEPA Analyses for Conservation Practices Incorporated by Reference**: USDA-NRCS has a long-standing structured, interdisciplinary, science-based, and public process for developing CPS and analyzing the effects of those practices.[3] Implementing these

[3] See, for example, the Environmental Quality Incentives Program Programmatic EA, March 2016 at https://www.nrcs.usda.gov/wps/portal/nrcs/detail/national/technical/nra/ec/?cid=nrcseprd387616 and research associated with the USDA-NRCS Conservation Effects Assessment Project at https://www.nrcs.usda.gov/wps/portal/nrcs/main/national/technical/nra/ceap/. See also the national USDA-NRCS CPS and

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 PDARP/PEIS. Because of this, all of the proposed action alternatives contemplate using USDA-NRCS conservation practices to achieve certain PDARP/PEIS restoration goals in this Plan. This analysis hereby incorporates by reference the standards and specifications for the conservation practices in Appendix D 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 matrices, the Network Effects Diagrams,[4] and in the USDA-NRCS Conservation Effects Assessment Project reports.[5] Each of those assessments is based on a review of the best available scientific studies and methodological approaches, as well as professional judgment.[6] In addition, this document incorporates by reference the analyses from the USDA-NRCS Environmental Quality Incentives Program Programmatic EA, March 2016, and in particular its discussions of the water quality impacts of USDA-NRCS conservation practices.

2. **The NEPA Analytical Approach for the Development of Nutrient Reduction (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 proposed alternative. Under all 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.[7] Conservation practices for each of the alternatives evaluated 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 species, cultural resources) 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 reduction. In addition to incorporating by reference the analysis USDA-NRCS has conducted on the effects of its conservation practices, the discussion in this draft RP/EA includes examples of the conservation practices that the FL TIG expects would be implemented in the

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associated Conservation Practice Physical Effects and Network Effects Diagrams at https://www.nrcs.usda.gov/wps/portal/nrcs/detailfull/national/technical/cp/ncps/ ?cid=nrcs143_026849

[4] Both the Conservation Practice Physical Effects matrices and network effects diagrams are available from the USDA-NRCS National Handbook of Conservation Practices website at https://www.nrcs.usda.gov/wps/portal/nrcs/detailfull/national/technical/cp/ncps/ ?cid=nrcs143_026849

[5] https://www.nrcs.usda.gov/wps/portal/nrcs/main/national/technical/nra/ceap/

[6] The majority of conservation practices likely to be implemented under the proposed action have been determined to fall within established USDA-NRCS categorical exclusions and therefore would not normally require preparation of an EA or EIS if implemented under USDA-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 AL TIG decided to prepare this EA to aid their planning, decision-making and compliance with NEPA.

[7] The landowner outreach program, conservation planning activities, and creation of conservation plans would not require project-specific environmental compliance measures described in this section.

project area for the proposed alternatives and how those practices are expected to affect the environment.

3. **The FL TIG Approach to Site-Specific Environmental Review for the Selected Properties:** Subsequent environmental review would occur in addition to this NEPA analytical approach to determine whether a planned site-specific action is below the maximum impacts described in this RP/EA. An example of the Environmental Evaluation Worksheet used to document this review is attached as Appendix F. If the site-specific action falls within the range of 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 FL TIG to the Administrative Record, where it would be publicly available. If the evaluation of the planned site-specific action indicates effects are likely to exceed the maximum impacts described in this RP/EA, the FL TIG would undertake additional site-specific environmental review consistent with NEPA requirements and other requirements for protection of the environment. The FL 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 Nutrient Reduction (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. Alternatives addressing Nutrient Reduction (Nonpoint Source) include development and implementation of conservation plans to reduce nutrient and sediment runoff, which would improve water quality in downstream coastal waters.

The sections below describe the anticipated environmental consequences for each resource area expected to be affected by the Nutrient Reduction restoration alternatives, including for the no action alternative.

Physical Resources

This project aims to improve water quality in the various watersheds by helping landowners develop and implement conservation plans that limit nonpoint source pollution. Implementing conservation measures are anticipated to primarily include installing erosion and sediment control structures on cropland. The installation of these structures would not involve any soil compacting activities and would not result in any short-term impacts on hydrology but may result in minor, adverse impacts on water quality and wetlands from ground-disturbing activities that could temporarily increase turbidity levels in nearby waters and temporarily disrupt the ecology of the wetland. This disruption is expected to cease shortly after the construction period. Stormwater BMPs would be utilized to keep any disturbed sediment from leaving the construction site. Floodplains would not incur any short-term impacts from the implementation of this project.

The project would ultimately decrease nutrient and sediment runoff and improve the hydrology of affected watersheds by restoring it to a more natural hydrologic cycle. It would also enhance water quality in the affected watershed by helping landowners develop and implement conservation plans

that reduce nonpoint source pollution. This would be a long-term, beneficial impact on the hydrology and water quality of the affected watersheds. The drainage area for the watershed would experience long-term, beneficial impacts on water quality as well. The decrease in runoff that would occur from this project would reduce flood hazard within the watershed, resulting in long-term, beneficial impacts on floodplains. The reduction in nonpoint source pollutants would enhance wetland health by decreasing the amount of nutrient and sediment inputs resulting in long-term, beneficial impacts on wetlands within the watershed. Stream crossings and grade stabilization installed in streams would be constructed would be designed so as not to cause an appreciable rise in floodwaters. Impacts on water quality and hydrology associated with grade stabilization structure (410), Grassed Waterway (412), Heavy Use Area Protection (561), Streambank and Shoreline Protection (580), Structure for Water Control (587) are extensively described in the Alabama RP/EA II, which anticipates short-term minor to moderate impacts of these actions.

There could be short-term, minor to moderate, adverse impacts on 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.

Best Practices. The FL TIG would consider best practices referenced in Section 6.15 and Appendix 6.A 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 on wetlands:

- In the design of conservation practices the FL TIG would consider resiliency measures related to increasing storm intensities and changing weather patterns (CEQ, 2016).
- Any practice that involves disturbance of wetlands would require authorization by USACE. A Nationwide Permit 27 Aquatic Habitat Restoration, Establishment, and Enhancement Activities would be obtained, 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 on wetlands and other aquatic resources to the maximum extent practicable.
- To the maximum extent possible, implement the placement of sediment to minimize impacts on existing vegetation or burrowing organisms.
- Apply herbicide in accordance with the direction and guidance provided on the appropriate USEPA 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 on land and in-water work.

In summary, the project is anticipated to result in short- and long-term minor, adverse impacts on water quality and wetlands from ground-disturbing activities that could temporarily increase turbidity levels in nearby waters and temporarily disrupt the ecology of the wetland. The project would also result in long-term benefits to physical resources.

Biological Resources

In general, the proposed watershed-scale nutrient reduction project would result in short-term, minor impacts on wildlife as a result of altered land management practices on primarily agricultural land uses, which include increased planting of cover crops to decrease erosion, planting field borders, and reduced application of pesticides and fertilizers. Adverse impacts on wildlife would include the temporary displacement and or disturbance to the species in proximity to the implemented land management practices. However, it is more likely that the altered land management practices would benefit wildlife as a result of reduced crop tillage, increased soil moisture storage, reduced fertilizer application, and reduced heavy equipment usage, all of which have demonstrated adverse impacts on wildlife. These changes to current land management would not have long-term, adverse impacts on any wildlife species because there would be no destruction or other changes to the configuration of wildlife habitat. The project would result in long-term, beneficial impacts on wildlife in the Pensacola Bay and Perdido River watersheds, especially for amphibians and aquatic fauna that are most sensitive to water quality. Reducing nutrient and sediment loads to the system would enhance habitat values for all species, and the project would indirectly benefit all downstream species through the improvement of water quality. Impacts on biological resources associated with grade stabilization structure (410), Grassed Waterway (412), Heavy Use Area Protection (561), Streambank and Shoreline Protection (580), Structure for Water

Control (587) are extensively described in the Alabama RP/EA II, which anticipates short-term, minor to moderate, adverse impacts from these practices.

Best Practices. The FL TIG would consider best practices referenced in Section 6.15 and Appendix 6.A 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 to avoid and minimize impacts on habitats and 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 a project, including personal gear, would be inspected and cleaned such that there is no observable presence of mud, seeds, vegetation, insects and other species.

Some project activities would involve the use of heavy equipment to implement improved agricultural land management practices (e.g., cover crops) or natural habitat enhancements (e.g., field borders). These activities could directly affect a small number of individual animals through by influencing their reproductive or foraging behavior as a result of human disturbance. However, because of the limited duration of the activities, any adverse effects would be minor and temporary.

The conservation practices implemented by this project would have an overall beneficial impact on all rare and protected species. Beneficial impacts on these species would result from water quality improvements because of targeted land management practices intended to reduce (1) nutrient losses from the landscape, (2) nutrient loads to streams and downstream receiving waters, and (3) water quality degradation in watersheds, and thus would provide benefits to coastal watersheds and marine resources. These beneficial impacts could translate downstream to affect protected species that could occur in estuaries and marine habitats, including bottlenose dolphin, West Indian manatee, loggerhead sea turtle, Kemp's ridley sea turtle, Gulf sturgeon, Alabama red-bellied turtle, piping plover, and red knot.

All conservation practices would occur on land. Additionally, all project activities would occur inland, not near coastal beaches or intertidal flats. There would be a lack of suitable habitat for ESA-listed species that are marine or estuarine, or that depend on beach/intertidal flat habitats. ESA-listed species that occur inland, in riparian areas, or on agricultural lands may be present within project areas once specific locations are identified. However, all of the restoration measures and management activities would be designed to have long-term beneficial impacts to habitats and the native species that utilize the areas and are expected to have minimal or no adverse impacts on the environment.

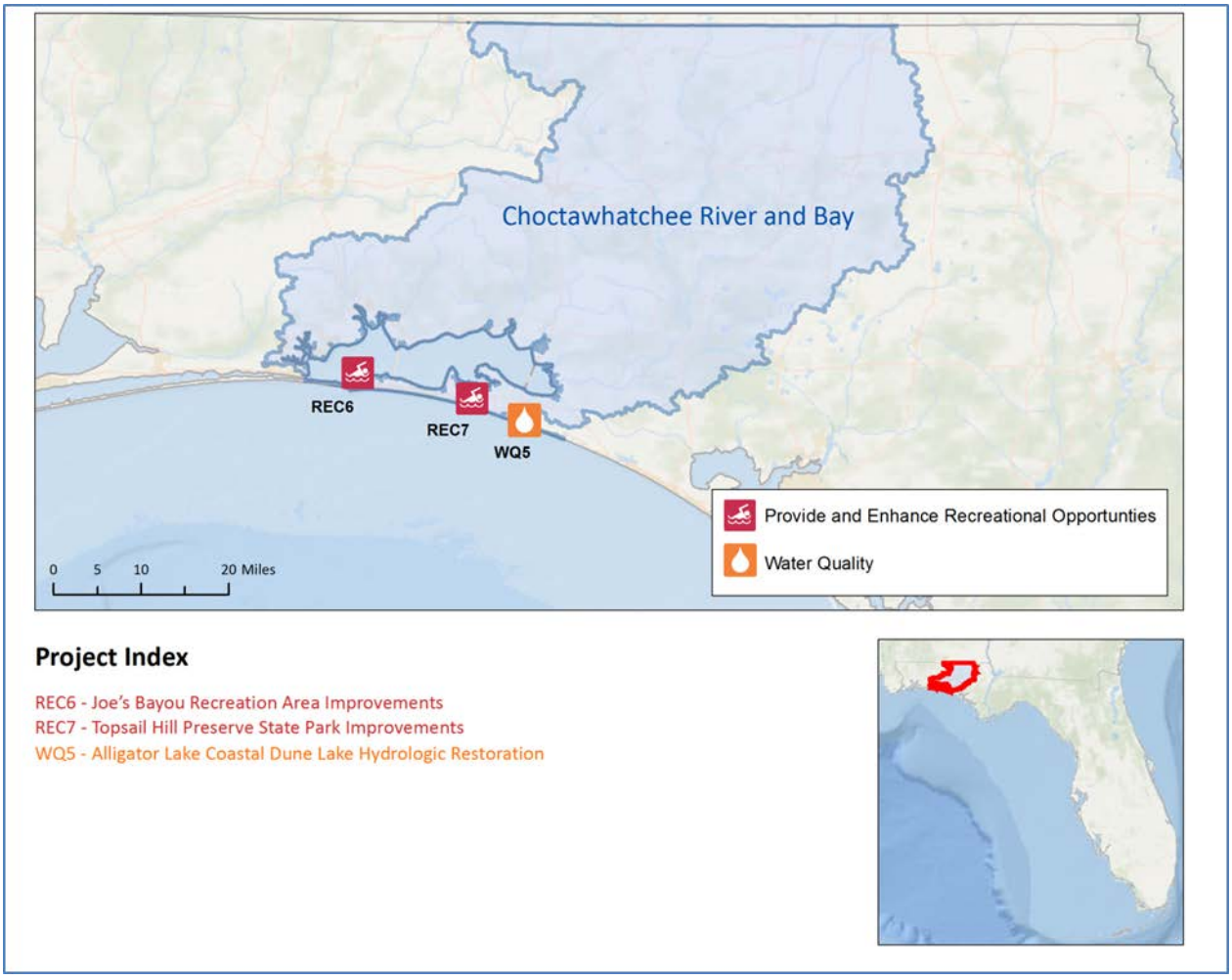
After identifying voluntary landowners, and prior to implementation of any project activities, additional coordination with USFWS would be required. Specific locations and management activities would be identified and Implementing Trustees would revisit this consultation to determine if any protected species and/or designated critical habitat occur in those areas. If occurrence is known or likely,

Implementing Trustees would identify potential impacts as well as measures to avoid or minimize impacts such that when implemented, impacts are insignificant or discountable. If a determination of "may affect, not likely to adversely affect" could not be made, Implementing Trustees would re-initiate the consultation. Re-initiation would also be required if the project description changed, or new information revealed that the effects of the proposed action may affect listed species in a manner or to an extent not considered, or a new species or critical habitat is designated that may be affected by the proposed action. The FL TIG has begun coordinating with the relevant regulatory agencies related to potential impacts to protected species and habitats.

In summary, the project is anticipated to result in short-term minor adverse impact and long-term benefits to biological resources.

4.7 Choctawhatchee River and Bay Watershed

Figure 4-12 Restoration Alternatives located in Choctawhatchee River and Bay Watershed



As shown in Figure 4-12, three projects are located in Choctawhatchee River and Bay watershed:

- REC6, Joe's Bayou Recreation Area Improvements
- REC7, Topsail Hill Preserve State Park Improvements; and
- WQ5, Alligator Lake Coastal Dune Lake Hydrologic Restoration Project (WQ5).

4.7.1 Area Overview

The Choctawhatchee River and Bay watershed incudes approximately 1,335,853 acres in Florida, accounting for about 40 percent of the 3,339,632-acre watershed that includes portions of both Alabama and Florida. The Choctawhatchee River is one of Florida's largest alluvial rivers, with an expansive river floodplain, a 129-square mile estuary, tidal marshes, and SAV beds. Other noteworthy habitats within the watershed include coastal dune lakes, Floridan aquifer springs, barrier islands, and longleaf-wiregrass forests. The watershed also includes some of Florida's fastest growing communities, as well as extensive public and private conservation lands.

The Choctawhatchee River and Bay SWIM Plan (NWFWMD 2017c) identified several watershed priorities for water quality and natural systems in the watershed. Water quality priorities include stormwater planning and retrofits, septic tank abatement, advanced onsite treatment systems, wastewater treatment and management improvements, and sediment abatement. The SWIM Plan identified development of riparian buffer zones, hydrologic restoration of aquatic and wetland systems, estuarine habitat restoration, and strategic land conservation to conserve protect natural systems in the watershed. Physical and biological resource descriptions presented here are summarized primarily from information provided in the SWIM Plan (NWFWMD 2017c). Other sources are cited.

4.7.1.1 Physical Resources

The Choctawhatchee River and Bay watershed is within the Gulf Coastal Plain physiographic region, described earlier for the Perdido River and Bay and Pensacola Bay watersheds in the western panhandle. The Choctawhatchee River and Bay watershed is within the Gulf Coastal Plain physiographic region, characterized by gently rolling hills, sharp ridges, prairies, and alluvial floodplains underlain by sand, gravel, porous limestone, chalk, marl, and clay. The sands, clays, shales, sandstones, and thin limestones thicken beneath the surficial deposits west of the Choctawhatchee River, while the hard limestones of the central and eastern panhandle are an uneven platform of carbonate bedrock of mainly limestone and sometimes of dolomite. Surficial sediments shift from sands in the northern portion of the watershed to sands and organic materials such as peat and muck in the southern portion of the panhandle (coastal lowlands) and east of the Choctawhatchee River. The bedrock of the eastern Panhandle also includes solution features such as numerous caverns, lime sinks, and other karst features.

Major tributaries to the Choctawhatchee River include Holmes, Wrights, Bruce, and Pine Log creeks in Florida. Direct tributaries to the bay include Alaqua, Rocky, Black, and Turkey creeks, and Choctawhatchee Bay includes approximately 129 square miles in Okaloosa and Walton counties. The watershed also includes a portion of the Sand Hill Lakes in Washington County, including recharge area for Floridan Aquifer springs discharging into Holmes Creek. The Choctawhatchee River system receives considerable groundwater contribution, and a number of Floridan aquifer springs occur in the watershed along Holmes Creek, Blue Creek, Sandy Creek, and the Choctawhatchee River. Prominent

springs in the watershed include Morrison Spring, which flows through a spring run to the Choctawhatchee River, Cypress Spring and Beckton Spring along Holmes Creek, and Ponce de Leon spring on Sandy Creek.

Coastal dune lakes are a conspicuous feature in the watershed and are almost exclusively found along the Gulf Coast in the U.S. These are naturally-formed lakes, intermittently connected to the Gulf of Mexico. Salinity in the lakes can be variable due to irregular connectivity with the Gulf, saltwater intrusion from salt spray, storm surge over wash, and from beneath during droughts. When dune lakes experience critical pre-flood levels, breaching water forms outlets through the dunes and channels to the Gulf. The lakes provide an important stopover point for migrating neo-tropical birds, habitat for aquatic and marine animals, freshwater for aquatic plants, and recreational resources for residents and visitors.

Tributaries in the watershed are affected by nonpoint source pollution and alterations associated with land use practices, including urban land uses, construction sites, silviculture, agriculture, landscape erosion, and unpaved roads. A total of 42 segments of the Choctawhatchee River and Bay watershed are designated as impaired, in addition to seven adjacent Gulf beaches. Choctawhatchee Bay and much of the river have been listed as impaired for nutrients. Bacteria impairments have also been identified for portions of the bay and several tributaries. Other identified impairments include DO in areas of the eastern bay and impairments for metals within several segments of the river basin and Turkey Creek. Potential pollution sources within the Choctawhatchee River basin include erosion, municipal wastewater, and nonpoint source pollution from agricultural areas. Pollution sources for Choctawhatchee Bay include urban stormwater runoff, septic tanks, and wastewater, as well as contributions from the river system.

4.7.1.2 Biological Resources

The Choctawhatchee River and Bay watershed includes upland, coastal, transitional, wetland, aquatic, estuarine, and marine communities making up 35 distinct natural communities identified by FNAI. Upland communities in the watershed include mesic flatwoods, sandhill, scrub, scrubby flatwoods, upland hardwood forests, wet flatwoods, and xeric hammocks. Longleaf pine that historically occupied much of the southeastern U.S., has declined to an estimated five percent of its original range due to conversion to pine plantations, fire suppression, and other factors.

Habitats associated with the Choctawhatchee River are shoreline snags, tributary valley lakes, and spring runs. Riparian habitats provide a transition zone between terrestrial and aquatic ecosystems and assist in mitigating or controlling nonpoint source pollution by filtering nutrients and sediment from surface runoff before it enters streams and stabilizing streambanks and slowing flood flows and reducing downstream flood peaks. Much of the bottomland along the river consists of hardwood forest, interspersed with pines. Tupelo and cypress swamps occupy some of the wetter areas, and tall levees and relict dunes provide mesic and xeric islands within the hydric bottomlands. However, no unlogged, old-growth cypress stands remain along the river. Upstream of the town of Ebro, bottomland hardwood forests are prevalent and are replace by seepage swamps downstream of the town. Steephead ravines and streams support distinctive plant communities and rare amphibians and some of the tributary

basins to the bay, such as Boggy Bayou and Rocky Bayou drainages, are the only known habitat for the Okaloosa darter. The stream systems supporting the darter have benefited from restoration, erosion control, and other recovery efforts and the darter's status was down-listed to threatened in 2010.

Listed species supported by upland communities within the watershed include the gopher tortoise, the reticulated flatwoods salamander, the eastern indigo snake, and the red-cockaded woodpecker. The Choctawhatchee and Pea rivers, as well as Choctawhatchee Bay, are critical habitat for the threatened Gulf sturgeon. The Choctawhatchee River and its tributaries also provide habitat for several species of threatened and endangered freshwater mussels. Along the coastal areas, beaches and coastal dune lakes support numerous listed species such as various shorebirds, sea turtles, and the Choctawhatchee beach mouse. More than 5,000 acres of SAV were reported in Choctawhatchee Bay in 2015. While benthic habitats in Choctawhatchee Bay primarily consist of sand and mud flats, as well as SAV beds, the bay also supports some oyster beds, primarily near the southern shore of the central and eastern reaches of the bay. Migratory birds such as piping plovers and red knots use lakeshore edges and outfalls for foraging during winter migrations. Snowy plovers and least terns use dune habitats adjacent to the coastal dune lakes for nesting and foraging habitat.

4.7.1.3 Socioeconomic Resources

One of the defining characteristics of the coastal reaches of the Choctawhatchee River and Bay watershed has been growth and development. Population in the Florida portion of the watershed has increased significantly over the last several decades: from approximately 134,556 in 1990 to 187,962 in 2010, a nearly 40 percent increase over 20 years. Population over the next twenty years (2010-2030) is projected to increase by perhaps 23 percent, with continuing changes in land use and increasing demands on wastewater and stormwater management systems. These changes require continuing cooperative efforts on the part of the state, regional and local governments, and the communities they serve.

Okaloosa County had a total population of 201,170 people, an increase of 11.3 percent since 2010, based on the 2016 U.S. Census. Approximately 81.6 percent of the county population is white, 10 percent are black or African American and about 8.7 percent Hispanic or Latino. The remaining population includes small percentages of American Indian, Asian, and Pacific Islander. Median household income reported in 2016 in the County was $57,655 and the percent of the county residents in poverty accounted for 10.7 percent of the population. Most of the county residents (91.3 percent) are high school graduates or higher. The county unemployment rate was 2.7 percent in 2016. In comparison, Camp Rudder, in the project area, has a resident population of 130 (individuals and families), that increases to approximately 430 when Ranger School is in session due to the addition of approximately 300 students. In addition, there are approximately 306 transient cadre and support personnel that live off-post in the surrounding communities. Neither minority populations nor low-income populations exist in the vicinity of the project area.

Walton County has a population 68,376. The percent of white individuals in Walton County (89.7 percent) is significantly higher than the State of Florida and the U.S., both approximately 77 percent (U.S. Census Bureau 2018). The percent of the population (aged 25 or older) with a high school

education in Walton County is 84.9 percent, which is lower than average in the State of Florida and for the U.S. (both 87 percent). The percent of the population (aged 16 or older) in the labor force in Walton County (56.7 percent) is lower than the State and National levels (58.5 and 63.1 percent respectively) (U.S. Census Bureau 2018). Median household income ($46,910) is slightly less then both the U.S. ($55,322) and Florida ($48,900). The percent of the population population living inin poverty is similar in Walton County (13.1 percent) to the U.S. and Florida (12.7 percent 14.7 and percent respectively; U.S. Census Bureau 2018).

A small portion of Bay County drains to Choctawhatchee River and Bay watershed. However, most of Bay County drains to St. Andrews watershed. Bay County demographic information is provided in the St. Andrews watershed description in Section 4.8.1.3.

4.7.2 REC6, Joe's Bayou Recreation Area Improvements (Preferred)

The Joe's Bayou Recreation Area improvements project encompasses Mattie Kelly Park and Joe's Bayou Recreation Area, which are approximately 11 acres and 2.2 acres, respectively, as well as 3.9-acre parcel recently purchased by the City of Destin in between these areas along the bayou shoreline (former Cemex plant site). These areas are located along the shoreline in Choctawhatchee Bay in Okaloosa County, FL (Figure 4-13). The primary parcel of Mattie Kelly Park is separated from the waterfront by Beach Drive to the northeast. A second parcel provides pier access on the bayou. Specifically, the project would include:

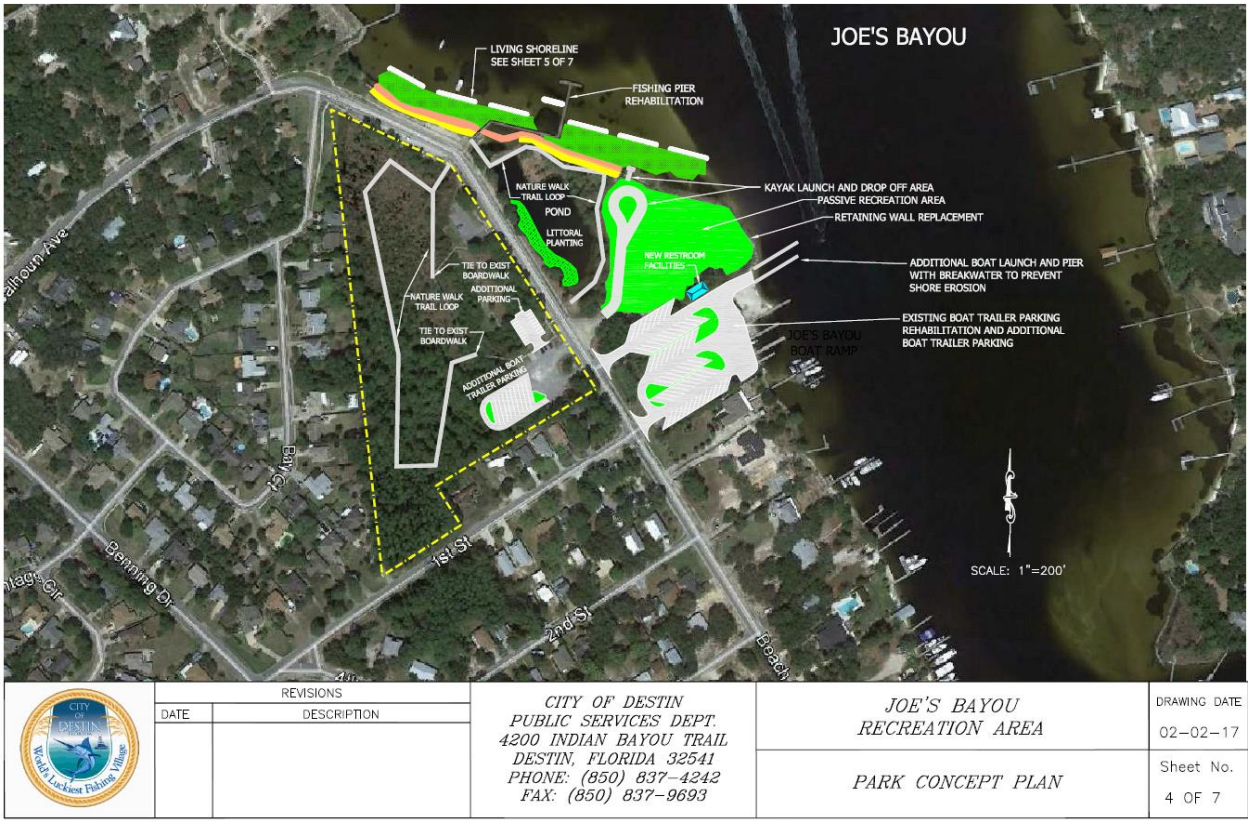
- Construction of a reef breakwater (approximately 1,000 linear feet), restrooms, walking trails, sidewalks (approximately 2,500 square yards), fishing pier (approximately 600 linear feet x 10 feet wide, 120 pilings), and boat ramp with pier (approximately 166 linear feet, 34 pilings);
- Backfill of the former Cemex plant site (approximately 8,000 cubic yards);
- Replacement of the former Cemex plant retaining wall (approximately 500 linear feet);
- Pond restoration including littoral planting and aeration;
- Saltmarsh (approximately 1.5 acres) and upland restoration (approximately 1 acre);
- Enhancement and improvements to a kayak/paddle-craft launch and pier (approximately 120 linear feet x 10 feet wide, 24 pilings);
- Rehabilitation and expansion of parking lots;
- Interpretive educational signs;
- Lighting improvements; and
- Landscaping/irrigation/benches/trash receptacles.

Additionally, at Mattie Kelly Park, the project would include:

- Wetland enhancement (approximately five acres);
- Construction of additional parking spaces and a boardwalk (approximately 1,500 linear feet x 8 feet wide and 300 pilings); and
- Drainage and stormwater treatment.

These additions would enhance the public's access to the surrounding natural resources and enhance recreational experiences. Additional details on the project are provided in Chapter 2 (Section 2.5.4).

Figure 4-13 Joe's Bayou Recreation Area Proposed Improvements



4.7.2.1 Affected Environment

Most of Joe's Bayou has been developed, and boat ramps, piers, and parking areas exist onsite. The new parcel that was previously heavily developed as a Cemex plant, with a large amount of existing paved areas and structures onsite. The improvements are on lands that are mostly disturbed and previously developed; there would be some restoration of shoreline and wetland habitats (e.g., reef breakwater). The landward parcel of Mattie Kelly Park has a low level of existing development with only a parking lot in the northeast section of the park, a boardwalk in a wetlands area, and a picnic area. The proposed improvements on this parcel would occur on lands that are largely undeveloped (e.g., location of additional parking and boardwalk).

Physical Resources

Joe's Bayou Recreation Area and Mattie Kelly Park are located in the Florida Panhandle, directly adjacent to Joe's Bayou in Choctawhatchee Bay. The project area is predominantly flat, on a geological formation called Citronelle, located in the Choctawhatchee Bay watershed and bordered directly by Joe's Bayou; the Gulf of Mexico is located to the south across the Destin peninsula. Choctawhatchee Bay substrate is characterized by fine-grain sand and organics. Soil in the area has been classified as predominantly Lakeland sand (12-30 percent slopes), Duckston sand, Kureb sand (0-8 percent slopes), and Dorovan

muck (USDA NRCS 2018). Except for the Dorovan muck, these soil types are composed primarily of sand. The improvements are proposed for soils classified as Lakeland, Duckston, and Dorovan muck. The Choctawhatchee River and many creeks and springs are the main freshwater inputs to the Choctawhatchee Bay which opens up to the Gulf of Mexico through the East Pass, adjacent to the Destin Peninsula. Choctawhatchee ranges from < 3 feet deep near the shorelines to > 30 feet in the middle western side of the estuary. The shoreline adjacent to the project area can be exposed at low tide. The area for the proposed new pier and boat dock ranges from 0 to 12 feet deep. Joe's Bayou in Choctawhatchee Bay is listed as a 303(d)-impaired waterbody for nutrients, as of 2014. There are various estuarine, freshwater, and marine wetland designations (based on the most updated wetland assessment; USFWS 2018b) within Mattie Kelly Park and Joe's Bayou and some of the proposed improvements would occur within designated wetlands (e.g., the boardwalk on Mattie Kelly and shoreline enhancements on Joe's Bayou). Joe's Bayou and Mattie Kelly are both located in FEMA-designated Flood Zone AE with minimal flood elevation of 8 feet (FEMA 2018). All of the upland improvements are located in this flood zone.

Biological Resources

Mattie Kelly Park is mostly covered by palustrine wetland habitat that may consist of broad-leaved deciduous and needle-leaved evergreen trees, shrubs, emergent plants, mosses, and lichens. The Joe's Bayou Recreation Area, Cemex parcel, and northern parcel of Mattie Kelly Park is mostly developed with some estuarine ponds and wooded areas (likely needle-leaved evergreen trees).

Based on available information, there is SAV in Joe's Bayou, adjacent to the site (Google Maps 2018; NOAA OR&R, UNH, and USEPA 2018). EFH for coastal migratory pelagics, stone crabs, reef fish, shrimp, and red drum is present in the Choctawhatchee Bay and Joe's Bayou, bordering the park (NOAA OR&R, UNH, and USEPA 2018).

Fish and wildlife potentially present in and around the site include migratory birds and select aquatic and terrestrial protected species. Migratory birds could potentially use this site for nesting, foraging, roosting, and breeding. Potential migratory bird groups include wading birds, shorebirds (e.g., terns), raptor, and songbirds. There are no bald eagles known to be present at this site (USFWS 2018a). Although these bird species could occur on the parcel, they are not known to inhabit or nest in the action area or in the nearby vicinity.

The list of federally threatened, endangered, proposed, candidate, and other species of concern for this site, as identified through USFWS IPaC, is presented in Table 4-20 (USFWS 2018a). There is no terrestrial critical habitat in the action area for the project. There is marine critical habitat for Gulf sturgeon in Choctawhatchee Bay (Unit 12; NOAA OR&R, UNH, and USEPA 2018). A list of all state and federally listed species found in this watershed is presented in Appendix E.

Table 4-20 Federally listed species potentially occurring in the Joe's Bayou Recreation Area Improvements project area

Common Name	Scientific Name	Habitat	Status	Likelihood
Gulf sturgeon	*Acipenser oxyrinchus desotoi*	Estuarine: various habitats; Marine: various habitats; Riverine: alluvial and blackwater streams.	T	Likely
Reticulated flatwoods salamander	*Ambystoma bishopi*	Palustrine: wet flatwoods, dome swamp, basin swamp; Terrestrial: mesic flatwoods (reproduces in ephemeral wetlands within this community).	E	Unlikely
Green sea turtle	*Chelonia mydas*	These turtles stay near the coastline and in bays near SAV habitats. They breed adjacent to the shoreline, and nest on sandy beaches.	T	Likely
Kemp's Ridley sea turtle	*Lepidochelys kempii*	Forage in sargassum and open waters. They breed adjacent to the shoreline, and nest on sandy beaches.	E	Likely
Loggerhead sea turtle	*Caretta caretta*	Forages in the open ocean and shallow coastal waters. They breed adjacent to the shoreline, and nest on sandy beaches.	T	Likely
West Indian manatee	*Trichechus manatus*	Estuarine: SAV, open water; Marine: open water, SAV.	T	Likely
Note: Species determined to be "Unlikely" to be found in the action area are not addressed further in this analysis. E=Endangered, T=Threatened, SAT=Similarity of Appearance (Threatened), C=Candidate, SSC=Species of Special Concern, CH=Critical Habitat.				

Socioeconomic Resources

The project area currently provides some public access to the waterfront via a boat launch, viewing pier, and docks. The Cemex parcel is highly disturbed. The landward parcel of Mattie Kelly Park currently provides a boardwalk as well a picnic area. The areas are administered by the City of Destin and are free and open to the public. The area surrounding the park is developed with mostly residential housing. The four parcels where the site is located are all designated as municipal use land type and are owned by the City of Destin.

4.7.2.2 Environmental Consequences

Only those resource areas for which potential impacts are expected are discussed in detail in for this alternative. The FL TIG analyzed the following resources in more detail below:

- **Physical Resources** – Geology and Substrates, Hydrology and Water Quality
- **Biological Resources** – Habitats, Wildlife Species, Marine and Estuarine Fauna, Protected Species
- **Socioeconomic Resources** – Socioeconomics, Land and Marine Management, Tourism and Recreational Use, Aesthetics and Visual Resources.

Physical Resources

Implementation of this alternative could include use of heavy construction equipment, such as bulldozers, barges, trucks, backhoes, tractor trailers, cranes, small barges with crane, small excavators, fork lifts, asphalt machine, roller, small power tools, generators, small trucks, and hand tools.

This project includes construction of piers, a boat ramp, and kayak launch rehabilitation and construction. New pilings would need to be installed for the piers and kayak launch (approximately 178 pilings). The proposed piers and launches would be ADA compliant. The boat ramp would be used to put-in and take boats out of the water. An oyster reef for the break water on the northern side of Joe's Bayou Recreation Area is proposed to be approximately 1,000 linear feet. The area would be subject to final design but may cover an area approximately 0.5 acres. There would also be construction of shoreline saltmarsh restoration (1.5 acres). The main branch of one of the piers and a kayak launch is northeast from the shoreline, the ramp with the pier and breakwater would be oriented generally east from the shoreline. Overwater area of the restored fishing pier is 6,000 square feet; kayak and paddleboard launch pier is 1,200 square feet; and the boat ramp with pier and breakwater would be approximately 3,000 square feet. In-water dredging or digging associated with installation of the pilings for the kayak launches and piers is not anticipated, though substrate displacement and compaction from dock piling installation is expected. Depth would be subject to final design, but there would be less than 140 square feet of substrate displaced in the aquatic environment from piling installation. Placement of new piles for boardwalk and dock construction would use the least invasive techniques (e.g., jetting, pushing, or driving the piles) where possible, but could use impact hammers given substrate and construction cost considerations. There may be digging associated with the construction of the boat ramp and breakwater. The depth would be subject to final design, but the area of impact would likely be less than 4,000 square feet.

Digging would also occur in the terrestrial environment for parking lots, sidewalks, restrooms, the boat ramp, and possibly for pond restoration and activities at the Cemex portion of the site. Digging and soil disturbance is mostly proposed for previously developed land, however, impacts from improvements would cover most of the Joe's Bayou site, approximately 4 acres and < 1 acre on the Mattie Kelly site (< 1 percent of the park). Construction and digging activities, including staging areas for construction equipment, would utilize existing development footprints and disturbed areas where possible (e.g., existing parking lots, the Cemex site), but digging and staging equipment could disturb some soils. The restrooms onsite would need connections to sewer and water. Although development of shoreline infrastructure would impact soils and sediments, they would concentrate activity along the shoreline and ultimately reduce the impacts to the shoreline. Additionally, upland work involving restoration of shorelines, pond, littoral habitat, and wetlands could stabilize soils and sediments at the site. Terrestrial work that may affect hydrology and water quality includes construction of additional impervious surfaces such as bathrooms, parking lots, and the boat ramp. Additional impervious surfaces could alter onsite stormwater run-off. In-water activities can temporarily impact water quality by increasing turbidity.

Specific mitigation measures would be implemented during construction to minimize erosion and overall soil impacts. Construction involving ground disturbances from proposed improvements and site

preparation activities would have short-term minor and long-term adverse impacts on geology and substrates. This project would result in minor short- as well as long-term adverse impacts on water quality and hydrology due to the potential construction of some impervious surfaces and site preparation activities. However, there could be improvements in water quality due to restoration activities that would reduce sedimentation and remove eroding paved area. As such, this project may have long-term beneficial effects on water quality.

In summary, the project would have short-term and long-term adverse minor impacts as well as long-term benefits to physical resources.

Biological Resources

The additions to the landward parcel of Mattie Kelly Park would be predominantly adjacent to previously developed areas (e.g., parking lots) and in the wetland (e.g., elevated boardwalk). The additions to Joe's Bayou are proposed for the areas that are mostly developed or disturbed, mowed grass areas, with some improvements being restoration proposed for natural habitats. The improvements would utilize existing infrastructure where possible. Any work in waters of the U.S., including wetlands, associated with this alternative would be coordinated with the USACE pursuant to Section 404 of the CWA. Coordination with the USACE and final authorization pursuant to CWA/RHA would be completed prior to final design and construction. USACE and NMFS construction guidelines regarding pier and dock construction would be followed where possible (USACE and NMFS 2001), and final placement and design would include considerations for ADA compliance.

Construction activities in water and on land associated with this alternative could result in short-term impacts to aquatic habitat due to erosion and increased turbidity during construction. The release of sediments during in-water and terrestrial construction would be controlled using BMPs and mitigation to protect aquatic habitats, prevent the transport of sediment into waterways, confine impacts to construction sites, and minimize the magnitude of the impacts on water quality in Joe's Bayou.

In-water and terrestrial improvements would avoid wetlands to the extent practical and feasible and are subject to regulatory consultations pending the final design. A benthic survey would need to be completed prior to any living shoreline improvements or in-water work. There is in-water work proposed for this alternative during dock construction, pier construction and rehabilitation, paddle-craft launch construction, and boat ramp construction. Additionally, some pilings may be required in shoreline areas for construction of the raised boardwalks leading to the pier, dock, and paddle-craft launches. The oyster reef/breakwater structures would be placed in locations to avoid SAV habitat. A benthic survey would be completed between June 1 and September 30 to determine whether the proposed activities would result in adverse impacts to SAV and EFH. The final design for Joe's Bayou would site the boat ramp to avoid boat ingress/egress impacts on SAV and should include the installation of navigational markers to reduce vessel prop scarring in nearby SAV habitat. Based on the in-water work in Joe's Bayou, there are minimal anticipated effects to EFH resulting from the project. Specific conservation and mitigation measures would be implemented during the finalization of engineering and design plans and construction to minimize erosion and overall habitat impacts.

Construction equipment and staging areas could impact habitat, but as noted previously, these would be sited on existing development footprints where possible to minimize impacts. Although the proposed improvements could impact habitats and biological resources (e.g., clearing of vegetation for nature trails), most of the improvements are proposed for currently disturbed areas and areas with grasses and vegetative understory. Additionally, the boardwalk on Mattie Kelly would impact habitat, but ultimately, it would direct and condense foot traffic into designated areas, benefiting habitats and species over the long-term.

The FL TIG would coordinate with the USFWS and review this alternative for impacts to bald eagles and migratory birds in accordance with the Bald and Golden Eagle Protection Act (BGEPA) of 1940 (16 U.S.C. §§ 668–668d) and the Migratory Bird Treaty Act of 1918 (MBTA) (16 U.S.C. §§ 703–712) to ensure that appropriate conservation measures and BMPs would be incorporated into the project. To the extent possible, construction activities would avoid specific habitat locations onsite if there are known nesting birds and avoid nesting seasons. Pre-construction nesting surveys for migratory birds and raptors would be conducted, specifically on the Mattie Kelly parcel. If evidence of nesting is found, the FL TIG would coordinate with the USFWS to develop and implement appropriate conservation measures. At a minimum, trees/shrubs with active nests would be flagged and avoided. To avoid or minimize impacts to migratory birds from increased human activity, the boardwalk would divert and concentrate recreational users away from any important nesting, foraging, or rookery locations including marsh habitat, ponds, and shoreline habitat where restoration would occur. Additionally, signage would be installed along shorelines, boardwalks, and piers to provide users information on sensitive species in the area and actions to take to avoid or minimize impacts to sensitive species. Foraging and resting birds may temporarily be displaced during construction or recreation activities. Bird roosting would not be affected because construction activities and most human use would occur during daylight hours.

The FL TIG has begun coordinating with the relevant regulatory agencies related to potential impacts to protected species and habitats. Conservation measures recommended during consultation would be incorporated into final project design and implementation to avoid and/or minimize impacts to protected species and critical habitats. Specific conservation measures would also be implemented during construction to avoid and minimize disruption and overall impacts to protected species. Below is a list of potential protected species at Joe's Bayou and Mattie Kelly Park, effects from the project activities, and potential conservation measures.

Sea turtles: Three sea turtle species could be present in the area (green, Kemp's ridley, and loggerhead). Turtle nesting typically occurs on Gulf side sandy beaches during the months of May through August, with hatching occurring from late July through October; it does not occur on the bay side where the project would be. There is potential for sea turtle encounters with private vessels using the boat ramp or increased fishing activities as turtles forage in the vicinity. The increase in boating activity could increase watercraft collisions with sea turtles in the bay; however, the increase should be negligible. BMPs such as those identified within the Sea Turtle and Smalltooth Sawfish Construction Conditions (NMFS 2006) and Measures for Reducing the Entrapment Risk to Protected Species (NMFS 2012) would be implemented and adhered to during periods of in-water work. Additionally, BMPs within the Vessel Strike Avoidance Measures and Reporting for Mariners (NOAA 2008) would be implemented. The

project may affect sea turtles and is likely to adversely affect sea turtles as a result of the pier and potential take from fishing piers.

West Indian manatee and marine mammals: The project location does not intersect with any identified critical habitat for the West Indian manatee, but they are likely present in Choctawhatchee Bay. There is the Choctawhatchee Bay stock of bottlenose dolphins. Main concerns with this project stem from short-term impacts associated with acoustic and entrapment issues during construction. Marine mammals are affected by vibrations and noise resulting from construction activities (e.g., generators, pile drivers, etc.). This project includes in-water work for the construction of piers, launches, breakwaters, and a boat ramp. If manatees are present, they would probably avoid the area during construction. To avoid and minimize impacts the BMPs identified within the Sea Turtle and Smalltooth Sawfish Construction Conditions (NMFS 2006), Vessel Strike Avoidance Measures and Reporting for Mariners (NOAA 2008), and the Standard Manatee Conditions for In-Water Work (USFWS 2011) would be implemented and adhered to during periods of in-water work. Additionally, signs such as Dolphin Friendly Fishing Tips, NMFS Southeast U.S. Marine Mammal and Sea Turtle Viewing Guidelines, and Don't Feed Wild Dolphins will be posted on and near piers. As a result of construction related activities, this project may have direct and/or indirect short-term adverse effects on the West Indian manatee and other marine mammals.

Gulf sturgeon and critical habitat: There is critical habitat for Gulf sturgeon (Unit 12) in Choctawhatchee Bay, and sturgeon are known to be in the bay and along the Gulf of Mexico shoreline. The action area is on and in water where sturgeon may be located. Potential impacts to the sturgeon include elevated noise levels and the presence of suspended sediments in the water column due to construction related activities. However, sturgeon are highly mobile and can avoid any disturbances in that area by swimming away. To mitigate potential affects to sturgeon and their critical habitat, standard BMPs such as those identified in the Sea Turtle and Smalltooth Sawfish Construction Conditions (NMFS 2006) and Gulf Sturgeon Mitigation Measures, would be followed. As a result of proposed construction activities proposed for the boat ramp, piers, breakwaters, and launches and anticipated recreational uses, this project component may have direct or indirect adverse effects on sturgeon and will likely have adverse effects on critical habitat. However, revegetation efforts could decrease stormwater runoff and subsequent declines in associated water quality impacts, thus providing long-term beneficial effects on sturgeon critical habitat off of Joe's Bayou.

Short- as well as long-term adverse impacts to biological resources would occur onsite as a result of construction and site preparation activities. Long-term impacts associated with habitat and wildlife disturbance from visitors on the site are anticipated to be minor to moderate. Additionally, there would be long-term beneficial impacts to biological resources due to restoration of salt marsh, shoreline, ponds, and wetlands at the site. Because the construction activities would be localized to the site and habitat fragmentation would be limited, impacts from this project to biological resources would be minor to moderate, adverse, short- and long-term with long-term beneficial impacts.

In summary, the project would result in short- and long-term minor to moderate adverse impacts as well as long-term benefits to biological resources.

Socioeconomic Resources

The project would be expected to result in short-term increase in construction jobs. During the construction phase of this project, construction equipment and operations would likely be located along in previously disturbed areas and parking lots. To the extent required, the use of construction equipment, including equipment used for the movement and placement of materials (i.e., barges) and barriers enacted to protect public safety would result in some minor to moderate short-term adverse impacts on aesthetics and visual quality. These impacts result from the presence of equipment, barriers and construction-related dust and emissions. During the construction period, visible impedances would detract from the natural landscape and create visual contrast for observers. Short-term closures of public areas may be required to accommodate construction activities, which could adversely affect visitors. From the public perspective, the site would be managed as it is at present, by the City of Destin, and improvements should improve and enhance visitor experiences at the park.

In summary, the project is anticipated to result in short-term minor adverse impacts to existing infrastructure and utilities, tourism and recreation, and aesthetics and visual resources. However, the project improvements would provide benefits and amenities to park visitors over the long-term.

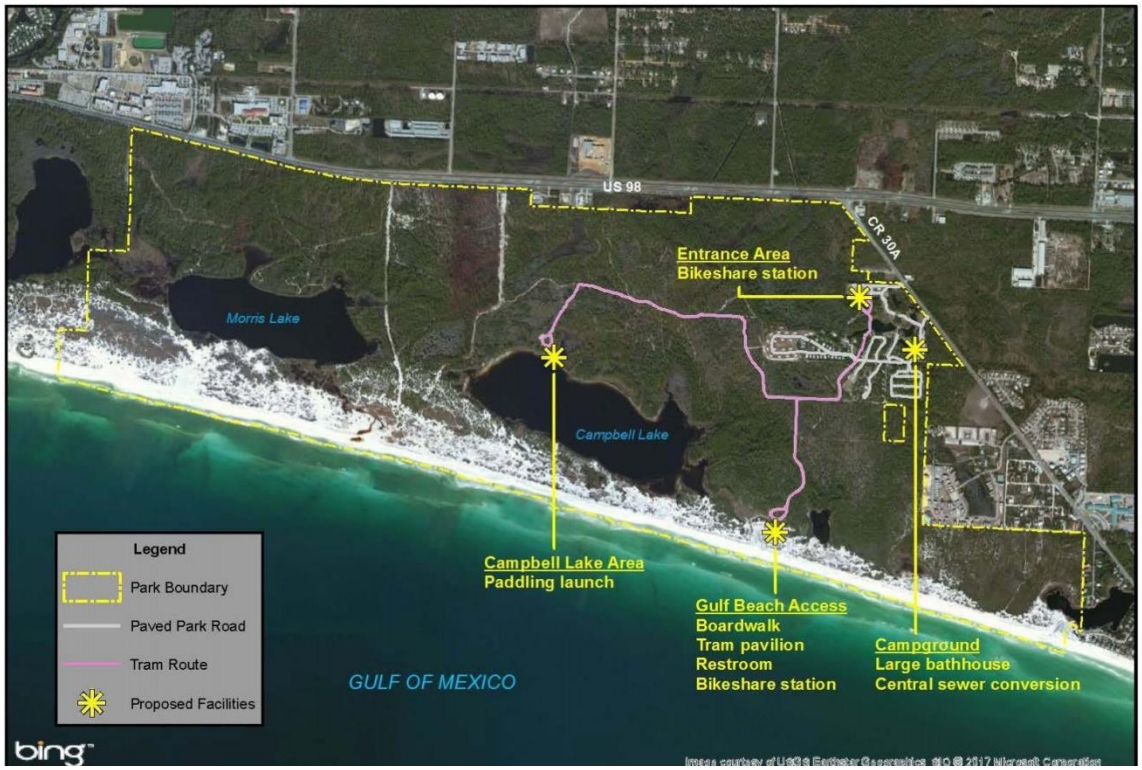
4.7.3 REC7, Topsail Hill Preserve State Park Improvements (Preferred)

Topsail Hill Preserve State Park is a 1,644-acre park located in the Florida Panhandle, directly adjacent to the Gulf of Mexico, with Choctawhatchee Bay to the north, separated by land on the Destin Peninsula. Specifically, the project would include:

- Construction of an open-air interpretive pavilion (approximately 20 x 30 feet) as a waiting area for the tram that currently circulates visitors from the entrance area to the Gulf beach access and Campbell Lake;
- Construction of two bike-share stations (approximately 20 x 30 feet) that would allow visitors to park and ride between the entrance and Gulf beach access areas with the ability to park bicycles at either end;
- Construction of an additional boardwalk at the Gulf beach-use area (approximately 800 x 8 feet);
- Construction of a tram pavilion at the north end of the boardwalk (approximately 20 x 30 feet);
- Construction of a 10-fixture restroom facility at the north end of the boardwalk (approximately 25 x 29 feet);
- Construction of a paddle-craft launch (likely less than 1,000 square feet) on the north shore of Campbell Lake, which would provide recreational access to one of the park's most significant features;
- Replacement of the campground bathhouse with a 25-fixture restroom facility (approximately 42 x 34 feet);
- Connection of all RV campsites and campground facilities to the central sewer system;
- Installation of interpretive signage at the entrance and other areas to educate visitors on the restoration efforts and rare coastal dune lake ecosystem.

These additions would enhance the public's access to the surrounding natural resources and enhance recreational experiences. Additional details on the project are provided in Figure 4-14 and Chapter 2 (Section 2.5.4).

Figure 4-14 Topsail Hill Preserve State Park Proposed Improvements



4.7.3.1 Affected Environment

Physical Resources

The park is located in the Gulf Coastal Lowlands, located in the Choctawhatchee Bay watershed. Soil in the area has been classified as predominantly Leon sand, Newhan-Corolla sand, Rutledge fine sand, Foxworth sand, and other sand types (e.g., Lakeland, Kureb, Kureb hilly, hurricane, and Mandarin; USDA NRCS 2018). These soil types are composed primarily of sand. The improvements are proposed for soils classified as Leon, Foxworth, and Lakeland sands. The lakes at the park are largely freshwater and their hydrology is not fully characterized but is likely surface water and not hydrologically connected to the Gulf of Mexico. As such, precipitation is the primary freshwater source to the lakes. All water bodies at Topsail are designated OFWs. Surface waters here are classified as Class III waters by FDEP. There is no aquatic preserve within or adjacent to the site. There are various estuarine, palustrine, and forested freshwater wetland designations (based on the most updated wetland assessment; USFWS 2018b) within Topsail. The proposed developments are near designated wetlands (e.g., paddle-craft launch, entrance improvements, campground improvements), but would avoid the wetlands where possible and as determined during final design. The park contains multiple FEMA-designated Flood Zones (i.e., Zone AE, Zone VE, Zone A and Zone X; FEMA 2018). Most of the improvements are located in Zone X areas of minimal flood hazard and Zone A.

Biological Resources

The environment consists of beach and dune habitat along the shoreline, maritime hammock, mesic flatwoods, mesic hammock, scrub and scrubby flatwoods, marsh, swamp, wet flatwoods, wet prairie, coastal dune lakes, tidal marsh, with some developed areas. Existing developed lands and infrastructure at the site consists of roads, parking lots, landscaped areas, and campground infrastructure. There are various estuarine, palustrine, and forested freshwater wetland designations within Topsail.

Based on available information, it appears that there may be patchy SAV beds along the shoreline in the Gulf of Mexico, but it is unknown if there are any SAV in the waters of Campbell Lake. EFH for coastal migratory pelagic fish, stone crabs, reef fish, and shrimp is present in the Gulf of Mexico to the south of the park, but none of the in-water work is proposed for the Gulf of Mexico waters or shoreline directly adjacent to EFH.

Fish and wildlife potentially present in and around the site include migratory birds and select aquatic and terrestrial protected species. Migratory birds could potentially use this site for nesting, foraging, roosting, and breeding. Potential migratory bird groups include wading birds (e.g., rails), shorebirds (e.g., terns, plovers, skimmers), raptors (e.g., bald eagles, kites), and songbirds (e.g., sparrows, warblers, woodpeckers). There is potential for bald eagles to be present at this site (USFWS 2018a). Although these species could occur on the parcel, they are not known to inhabit or nest in the action area or in the nearby vicinity. All activities would take place landward of the dune habitat areas.

The list of federally threatened, endangered, proposed, candidate, and other species of concern for this site, as identified through USFWS IPaC, is presented in Table 4-21 (USFWS 2018a). There is terrestrial critical habitat for the Choctawhatchee beach mouse (Unit 2) in the park along the Gulf of Mexico frontage; generally, south of any action areas (NOAA OR&R, UNH, and USEPA 2018). While there is marine critical habitat for Gulf sturgeon on the Gulf of Mexico side of the park, it is outside of the project action area (Unit 11; NOAA OR&R, UNH, and USEPA 2018). A list of all state and federally listed species found in this watershed is presented in Appendix E.

Table 4-21 Federally listed species potentially occurring in the Topsail Hill Preserve State Park Improvements project area

Common Name	Scientific Name	Habitat	Status	Likelihood
Reticulated flatwoods salamander	*Ambystoma bishopi*	Palustrine: wet flatwoods, dome swamp, basin swamp; Terrestrial: mesic flatwoods (reproduces in ephemeral wetlands within this community).	E	Unlikely
Eastern indigo snake	*Drymarchon corais couperi*	Terrestrial: mesic flatwoods, upland pine forest, sandhills, scrub, scrubby flatwoods, rockland hammock, ruderal.	T	Potentially
Gopher tortoise	*Gopherus polyphemus*	Terrestrial: sandhills, scrub, scrubby flatwoods, xeric hammocks, coastal strand, ruderal.	C	Likely
Green sea turtle	*Chelonia mydas*	Stays near the coastline and in bays near SAV habitats. They breed adjacent to the shoreline, and nest on sandy beaches.	T	Likely

Common Name	Scientific Name	Habitat	Status	Likelihood
Loggerhead sea turtle	*Caretta caretta*	Forages around coral reefs; spends time in bays and estuaries. They breed adjacent to the shoreline, and nest on sandy beaches.	T	Likely
Kemp's Ridley sea turtle	*Lepidochelys kempii*	Forage in sargassum and open waters. They breed adjacent to the shoreline, and nest on sandy beaches.	E	Likely
Leatherback sea turtle	*Dermochelys coriacea*	Forages in the open ocean waters. They breed in deep waters adjacent to the shoreline, and nest on sandy beaches.	E	Likely
Piping plover	*Charadrius melodus*	Estuarine: exposed unconsolidated substrate; Marine: exposed unconsolidated substrate; Terrestrial: dunes, sandy beaches, and inlet areas; mostly wintering and migrants.	T	Likely
Red knot	*Calidris canutus rufa*	Estuarine: bays, tidal flats, salt marshes; Terrestrial: sandy beaches; Marine: aerial, near shore.	T	Unlikely
Wood stork	*Mycteria americana*	Estuarine: marshes; Lacustrine: floodplain lakes, marshes (feeding); Palustrine: marshes, swamps, roadside ditches.	T	Potentially
Choctawhatchee beach mouse	*Peromyscus polionotus allophrys*	Terrestrial: sand dunes with a moderate cover of grasses and forbs.	E	Likely
Note: Species determined to be "Unlikely" to be found in the action area are not addressed further in this analysis. E=Endangered, T=Threatened, SAT=Similarity of Appearance (Threatened), C=Candidate, SSC=Species of Special Concern, CH=Critical Habitat.				

Socioeconomic Resources

Topsail Hill State Park has 3.2 miles of beaches managed by FDEP Division of Recreation and Parks. Tourists pay an entrance fee to use the park amenities including restrooms, trails, and access to fishing, and swimming. Coastal dune lakes provide freshwater fishing of many culturally significant fish such as bass, bream and catfish. The parcels where the site is located are all state-owned lands.

The park has existing infrastructure that includes trails, a number of rented cabins, picnic pavilions, concessions, restrooms, a visitor's center and an amphitheater that hosts cultural and community events. There are no designated protected view sheds in the vicinity of this project (FDEP 2007).

4.7.3.2 Environmental Consequences

Only those resource areas for which potential impacts are expected are discussed in detail in for this alternative. The FL TIG analyzed the following resources in more detail below:

- **Physical Resources** – Geology and Substrates, Hydrology and Water Quality
- **Biological Resources** – Habitats, Wildlife Species, Marine and Estuarine Fauna, Protected Species
- **Socioeconomic Resources** – Socioeconomics, Land and Marine Management, Tourism and Recreational Use, Aesthetics and Visual Resources.

Physical Resources

Implementation of this project could include use of heavy construction equipment, such as bulldozers, barges, trucks, backhoes, tractor trailers, cranes, small barges with crane, small excavators, fork lifts, asphalt machine, roller, small power tools, generators, small trucks, and hand tools.

This project includes in-water work for the paddle-craft launch on Campbell Lake which is not hydrologically connected to the Gulf of Mexico or any marine/estuarine waters. The overwater area of the launch would be determined during final design, but for the purposes of this RP/EA, it is assumed to be less than 1,000 square feet. The launch may include placement of new pilings. Piling installation would use the least invasive techniques (e.g., jetting, pushing, or driving the piles) where possible, but could use impact hammers, given substrate and construction cost considerations. In-water dredging or digging associated with installation of the pilings for the launch is not anticipated, though substrate displacement and compaction from piling installation would be expected. Depth would be subject to final design, but there would a small volume of substrate displaced in the marine and adjacent areas from the piling installation (approximately 35 square feet). During construction, BMPs and boom placement along with other avoidance and mitigation measures required by state and federal regulatory agencies would be employed to minimize any water quality and sedimentation impacts. However, there are no anticipated effects to water bodies outside of Campbell Lake.

Digging would also occur in the terrestrial environment, over less than half an acre. Construction and digging activities, including staging areas for construction equipment, would utilize existing development footprints and disturbed areas where possible (e.g., parking lot), but digging and staging equipment would disturb some soils. The restrooms onsite would need connections to sewer and water, which would be run along an existing roadway. The specific needs would be determined during final designs. Development of boardwalks would impact soils, but they would direct and condense foot traffic into designated areas, minimizing adverse impacts. The depth of digging and disturbance depends on final engineering design. Terrestrial work that may affect hydrology and water quality includes construction of additional impervious surfaces such as bathrooms and pavilions. Additional impervious surfaces would alter onsite stormwater run-off. Pervious pavement would be used in the parking area to minimize runoff and potential water quality impacts if feasible. Construction of the parking and restroom facilities and the removal of road debris may temporarily impact water quality.

Specific mitigation measures would be implemented during construction to minimize erosion and overall soil and water quality impacts. Ground disturbances resulting from construction of the proposed improvements, impervious surfaces, and site preparation activities would have short-term minor and long-term adverse impacts on geology, substrates, hydrology, and water quality.

In summary, the project would have short-term and long-term adverse minor impacts to physical resources.

Biological Resources

The proposed improvements are partly on lands that are undeveloped or undisturbed (e.g., kayak launch, boardwalk, new restroom), with some improvements on previously disturbed and developed

lands (e.g., updated bathhouse, sewer connections, interpretive pavilion). The improvements would utilize existing infrastructure where possible. The additions to the site are proposed on land that may consist of mesic flatwoods, basin swamp, scrub, and maritime hammock. There are various estuarine, palustrine, and forested freshwater wetland designations (based on the most updated wetland assessment; USFWS 2018b) within the park. The proposed developments are near designated wetlands (e.g., paddle-craft launch, entrance improvements, campground improvements), but would avoid them where possible. Any work in waters of the U.S., including wetlands, associated with this alternative would be coordinated with the USACE pursuant to Section 404 of the CWA. Coordination with the USACE and final authorization pursuant to CWA/RHA would be completed prior to final design and construction. USACE and NMFS construction guidelines would be followed, where possible, regarding paddle-craft launch construction (USACE and NMFS 2001). Final placement and design would include considerations for ADA compliance.

Construction activities in water and on land associated with this project could result in short-term impacts to aquatic habitat due to erosion and increased turbidity during construction. However, these impacts would be confined to Campbell Lake, as it is not hydrologically connected to the Gulf of Mexico or Choctawhatchee Bay. The release of sediments during in-water and terrestrial construction would be controlled using BMPs and mitigation to protect aquatic habitat, confine impacts to construction sites, and minimize the magnitude of the impacts on water quality in Campbell Lake.

In-water and terrestrial improvements would avoid wetlands to the extent practical and feasible and are subject to regulatory consultations depending on the final design. An analysis of SAV, likely via aerial imagery analysis, would be conducted prior to the start of construction. Based on the paddle-craft launch and trail/boardwalk leading up to the launch, there may be piling installation required. However, Campbell Lake is not hydrologically connected to the Bay or Gulf of Mexico, so there are no anticipated effects to EFH or SAV resulting from the project. Specific conservation and mitigation measures would be implemented during the finalization of engineering and design plans and construction to minimize erosion and overall habitat impacts.

Construction equipment and staging areas could impact habitat, but as noted previously, these would be sited on existing development footprints where possible to minimize impacts. Although the pavilions, bike share stations, boardwalks, and restrooms could potentially impact habitats and biological resources (e.g., clearing of vegetation for improvements), some of the improvements are proposed for currently disturbed areas or areas with human traffic at present (e.g., the site for the paddle-craft launch is currently shoreline habitat where kayaks are kept and people use the shoreline there to access Lake Campbell). The paddle-craft launch and boardwalks would direct and condense foot traffic into designated areas, benefitting habitats and species over the long-term. The restrooms and tram pavilions may remove habitat within the footprint of the structures. To mitigate potential impacts to the dune habitat from the construction of a boardwalk, the Conservation Measures for Dune Walkover Construction (USFWS 2017) would be implemented during final design and construction.

The FL TIG would coordinate with the USFWS and review this project for impacts to bald eagles and migratory birds in accordance with the Bald and Golden Eagle Protection Act (BGEPA) of 1940 (16 U.S.C.

§§ 668–668d) and the Migratory Bird Treaty Act of 1918 (MBTA) (16 U.S.C. §§ 703–712) to ensure that appropriate conservation measures and BMPs would be incorporated into the project. To the extent possible, construction activities would avoid specific habitat locations onsite if there are known nesting birds and avoid nesting seasons. Pre-construction nesting surveys for migratory birds and raptors would be conducted and if evidence of nesting is found, the FL TIG would coordinate with the USFWS to develop and implement appropriate conservation measures. At a minimum, trees/shrubs with active nests would be flagged and avoided. To avoid or minimize impacts to migratory birds from increased human activity, boardwalks would divert and concentrate recreational users away from any important nesting, foraging, or rookery locations. Additionally, signage would be installed along boardwalks to provide users information on sensitive species in the area and actions to take to avoid or minimize impacts to sensitive species. Foraging and resting birds may temporarily be displaced during construction or recreation activities. Bird roosting would not be affected because construction activities and most human use would occur during daylight hours.

The FL TIG has begun coordinating with the relevant regulatory agencies related to potential impacts to protected species and habitats. Conservation measures recommended during formal consultation would be incorporated into final project design and implementation to avoid and/or minimize impacts to protected species and critical habitats. Specific conservation measures would also be implemented during construction to avoid and minimize disruption and overall impacts to protected species. Below is a list of potential protected species at Topsail Hill, effects from the project activities, and potential conservation measures.

Gulf sturgeon and critical habitat: There is critical habitat for Gulf sturgeon (Unit 11) along the Gulf of Mexico side of Topsail Hill Preserve State Park. All in-water work would be in Campbell Lake which is not hydrologically connected to the Gulf of Mexico where there is critical habitat and where sturgeon could be present. Additionally, there are no improvements proposed directly adjacent to the Gulf of Mexico waters. Potential impacts to the Gulf sturgeon include elevated noise levels and the presence of suspended sediments in the water column due to construction related activities. However, it is unlikely that any improvements would impact Gulf sturgeon or their critical habitat. Based on the distribution of Gulf sturgeon and critical habitat, this project is likely to have no effect on the species or critical habitat.

Choctawhatchee beach mouse and critical habitat: There is critical habitat for the Choctawhatchee beach mouse (Unit 2) at the site and the beach mouse is known to inhabit the site. Due to the location of the critical habitat in most of the southern part of the park along the Gulf of Mexico, with most of the proposed improvements being proposed for previously disturbed sites and locations on the northern half of the park, it is not likely that the beach mouse would be present in the action area. This species is highly mobile and is likely to leave the area during construction. However, if any of these mice are encountered onsite in the action areas, construction would be halted and USFWS would be contacted. Topsail Hill has a relatively stable population of beach mice, so final design would be developed to avoid critical habitats and beach mouse impacts. The final design will take into consideration the critical habitat and species distribution of this mouse. For example, construction methods will be top down, with a minimum of a three foot height above the dunes. If the boardwalk, tram pavilion, restroom, or bike share station are constructed through or adjacent to this critical habitat, construction activities

would likely cause adverse impacts to the beach mouse habitat. Impacts could result from construction activities and increased visitation from noise, erosion, and damaged dunes and vegetation. The proposed improvements would avoid direct and indirect impacts to critical habitat, where feasible. As such, this project would not have any long-term indirect or direct adverse impacts on beach mouse critical habitat.

Piping plover: The piping plover does occur at this site and use specific areas for resting and foraging. There is suitable habitat present on the park for this species along the shoreline and in the dunes. If construction occurs during the summer months (approximately May to August), the species is not generally present along the Gulf coast. However, construction may need to occur in other months which could generate construction noise and disturbance to resting and foraging birds, should they be present on the site. Thus, while this project may affect piping plover it is not likely to adversely affect this species.

Wood stork: While this species could occur on the site, it is not known to occur on site. There are no known nest sites, but they could use the site for roosting and foraging. Construction activities could disrupt resting and foraging activities, but the birds would likely move to a different location if disturbed. Because this site has preferable habitat for the wood stork, the proposed improvements and activities at the site during construction could affect the species, but it is unlikely to adversely affect the species.

Gopher tortoise: Existing uplands at this site have preferable habitat and the gopher tortoise is found onsite in the scrub and dune habitats. Improvements that destroy gopher tortoise habitat would directly impact these species, however, the proposed improvements would avoid impacts to burrows, the tortoise, and its habitat, where feasible. If any burrows are encountered in construction and staging areas, they would need to be relocated (after consulting with USFWS). As such, no direct or indirect adverse effects on the gopher tortoise are anticipated.

Eastern indigo snake: While the Eastern indigo snake could inhabit the site, none are known to inhabit the site. It frequently co-inhabits gopher tortoise burrows, thus, if encountered, the Eastern indigo snake would be subject to the same removal and relocation efforts. Thus, while this project may affect the Eastern indigo snake, it is not likely to adversely affect this species.

Sea turtles: The project location does not intersect with any identified sea turtle critical habitat in water or on land. However, sea turtles such as green and loggerhead turtles do nest on the beaches at the site. Many of the planned improvements in the beach area (e.g., bike share station, restroom, and tram pavilion) are proposed for construction landward of the dune areas. The boardwalk would intersect beach and dune habitat. Construction activities for these components would take place during the day, so activities should not impact nesting sea turtles. However, any lights installed on the improvements or lights left on overnight during construction could disorient nesting sea turtles. To avoid light impacts to nesting sea turtles, no lights will be installed on boardwalks. Additionally, Dune Walkover Guidance (2006) and Conservation Measures for Dune Walkover Construction (2017) will be followed. There is no in-water work in waters connected to water bodies where sea turtles would be present. As a result of

construction related activities and improvements, this project may have direct or indirect adverse effects on sea turtles. Adverse effects from construction would be avoided or minimized by using conservation measures and construction BMPs.

Short-term as well as long-term adverse impacts to biological resources would occur onsite as a result of construction and site preparation activities. Long-term impacts associated with habitat and wildlife disturbance from visitors on the site are anticipated to be minor.

In summary, because the construction activities would be localized to the site and habitat fragmentation would be limited, impacts from the project to biological resources would be minor, adverse, short- and long-term.

Socioeconomic Resources

The project would be expected to result in short-term increase in construction jobs. During the construction phase of this project, construction equipment and operations would likely be located along in previously disturbed areas and parking lots. To the extent required, the use of construction equipment, including equipment used for the movement and placement of materials (i.e., barges) and barriers enacted to protect public safety would result in some minor to moderate short-term adverse impacts on aesthetics and visual quality. These impacts result from the presence of equipment, barriers and construction-related dust and emissions. During the construction period, visible impedances would detract from the natural landscape and create visual contrast for observers visiting the project areas. Short-term closures of public areas may be required to accommodate construction activities, which could adversely affect visitors.

Over the long-term, the infrastructure improvements included in this project would impact the appearance of the area, creating a more developed appearance, and provide more recreational opportunities. From the public perspective, the site would be managed as it is at present, as a state park, and improvements should enhance visitor experiences at the park.

In summary, the project is anticipated to result in short-term minor adverse impacts to existing infrastructure and utilities, aesthetics and visual resources, and tourism and recreation. However, the project improvements would provide benefits and amenities to park visitors over the long-term.

4.7.4 WQ5, Alligator Lake Coastal Dune Lake Hydrologic Restoration (Preferred)

The project would replace the portion of Walton County CR30A that crosses Alligator Lake and install a bridge along a section of the new road. The purpose of the project is to replace aging, inadequate, and collapsed culverts that now inhibit the exchange of water between the upper and lower lake, with a bridge to restore the hydrologic connection between the upper and lower lake. Sixty percent design plans (Walton County Public Works Department 2017) indicate the total project length is approximately 720 feet and the total bridge length would be 40 feet. Riprap would be installed under the bridge at the water edge to stabilize the banks.

4.7.4.1 Affected Environment

Alligator Lake is located in south Walton County. County Road 30A crosses the lake in an east-west direction and divides the lake into north and south portions. The lake is surrounded by Grayton Beach State Park except for the Gulf Trace subdivision on the southwest side and is within a half mile of the Gulf of Mexico. Several beach access points are located along the road's entire length.

Physical Resources

Alligator Lake makes up nearly five acres of the 7.43-acre project area. Nearly 85 percent (2.21 acres) of the remaining project area are upland sandy soils and less than 0.5 acres of wetland soils make up the remaining project area. Alligator Lake is a coastal dune lake, which is characterized by periodic connection to the Gulf of Mexico via storm and tide action. The openings close when flow is inadequate to maintain the outlet to the Gulf. Alligator Lake drains to a channel south of CR30A, which then meanders between dunes and across the beach into the Gulf of Mexico via an unaltered outlet. The wetland soils are Dorovan-Pamlico black mucks, which characterize many of the frequently flooded wetlands in the panhandle of Florida. Historic tidal exchange between upper and lower portions of the lake were reduced by construction of CR30A and subsequent aging, filled, damaged, and collapsed culverts have further reduced and/or eliminated the tidal exchange between the upper and lower portions of the lake, removing the influence of salinity on the upper lake and the contribution of the upper lake into the lower lake and the Gulf. Sediments accumulate on the upstream side of the culverts causing the depth of water to be dramatically different on the north and south side of the road. Additionally, the culverts restrict the lakes from flushing naturally. There are presently no water quality impairments documented for Alligator Lake. A data summary provided by the Choctawhatchee Basin Alliance (CBA 2016) indicated that for the time period examined (2003-2015), no significant trends were determined for total phosphorus, total nitrogen, total chlorophyll, or transparency.

Biological Resources

Rainfall, lateral ground water seepage through surrounding coastal sand, and water from the Gulf are the primary hydrologic influences on coastal dune lakes, which may exhibit dramatic seasonal changes in salinity. Vegetation may be largely restricted to wetland grasses and herbs or a dense shrub thicket along the shore, depending on fire frequency and/or water fluctuations. Submersed aquatic plants may characterize much of the surface of the lake. Emergent plants often include rushes, sedges, pennywort, cattails, sawgrass, waterlilies, royal fern, marsh elder, salt bush, and black willow (NAI 2010).

Coastal dune lakes are important breeding areas for many insects that form the base of numerous food chains (FNAI 2010). They support numerous fish and wildlife species and may also be important water sources for many mammals and birds inhabiting the surrounding xeric and coastal communities. Wading birds and ducks may also use these lakes as feeding and resting areas. Animals associated with the coastal dune lakes in the panhandle include western mosquitofish, sailfin molly, American alligator, eastern mud turtle, saltmarsh snake, little blue heron, American coot, and North American river otter, and numerous other species.

CR30A separates the north portion of the lake and because existing culverts do not function adequately, freshwater conditions characterize the lake north of CR30A, while the lower lake is estuarine due to the

influence of the Gulf. Vegetation within the project area is upland pines on either side of the road, with SAV along the road-lake margins. Wetland and aquatic vegetation in the upper lake is primarily freshwater, compared with estuarine vegetation in and along the lower lake. The culverts act as barriers to fish and wildlife making it difficult for them to travel between the upper and lower lake portions.

Federally listed plants such as the Telephus spurge and Cooley's meadowrue potentially occur in region, but right-of-way and associated areas along CR30A are not likely to support these species (Table 4-22). The Gulf of Mexico is designated Critical Habitat for Gulf sturgeon, but the critical habitat does not extend into Alligator Lake. American alligator, eastern indigo snake, and gopher tortoise potentially occur in the project area, based on regional presence and local habitat. Sea turtle and shore bird nesting in the project area is unlikely but is documented to occur along the Gulf coast. Shore birds (piping plover and red knot) potentially occur in the project due to possible foraging, although nesting would be limited to the beaches outside the project area. Wood storks would be expected along the edges of Alligator Lake. Red cockaded woodpeckers prefer mature longleaf pine forests are not likely to occur in the scrub pines and wetlands proximate to the project area. The Choctawhatchee beach mouse inhabits dunes and uses beaches and interdunal swales that characterize the habitats south of the project area but is not likely to occur in the project area. No amphibians are anticipated in the habitat due the absence of ephemeral ponds and flatwoods. Federal and state listed threatened and endangered species and their habitats are listed in Appendix E for the Choctawhatchee River and Bay watershed and federally listed species, as identified through IPaC and FNAI, that potentially occur in the project area are provided in Table 4-23 (USFWS 2018a, FNAI 2018).

Table 4-22 Acres of habitat in the Coastal Dune Lake Hydrologic Restoration for Alligator Lake project area

FLUCCS Code	Acres	Percent of Total Area
Developed - Total	**0.45**	**6.07**
Urban and Built-Up	**0.45**	**6.07**
1210: Medium Density, Fixed Single Family Units	0.04	0.58
1920: Inactive Land with Street Patterns but Without Structures	0.41	5.49
Undeveloped - Total	**6.98**	**93.93**
Upland Forests	**2.79**	**37.55**
4100: Upland Coniferous Forests	2.79	37.55
Wetlands	**1.32**	**17.82**
6440: Emergent Aquatic Vegetation	1.32	17.82
Water	**2.87**	**38.56**
5200: Lakes	2.87	38.56
Grand Total	**7.43**	**100.00**
Note: values may not add up due to rounding.		

Table 4-23 Federally listed species potentially occurring in the Coastal Dune Lake Hydrologic Restoration for Alligator Lake project area

Common Name	Scientific Name	Habitat	Status	Likelihood
American alligator	*Alligator mississipiensis*	Estuarine: herbaceous wetland Riverine: river, creek, low gradient, medium river, pool, spring/spring brook Lacustrine: shallow water Palustrine: forested wetland, herbaceous wetland, riparian, scrub-shrub wetland	SAT	Potential
Eastern indigo snake	*Drymarchon corais couperi*	Terrestrial: mesic flatwoods, upland pine forest, sandhills, scrub, scrubby flatwoods, rockland hammock, ruderal	T	Potential
Gopher Tortoise	*Gopherus polyphemus*	Terrestrial: mesic flatwoods, upland pine forest, sandhills, scrub, scrubby flatwoods, rockland hammock, ruderal	C	Potential
Wood stork	*Mycteria americana*	Estuarine: marshes Lacustrine: floodplain lakes, marshes (feeding), various Palustrine: marshes, swamps, various	T	Potential
Red knot	*Calidris canutus rufa*	Estuarine: Prefer open coastal areas including sandy beaches and tidal flats; areas along the shoreline, including the mudflats.	T	Unlikely
Choctawhatchee beach mouse	*Peromyscus polionotus aliophyrs*	Terrestrial: beach dune, coastal scrub	E(CH)	Unlikely
Note: Species determined to be "Unlikely" to be found in the action area are not addressed further in this analysis. E=Endangered, T=Threatened, SAT=Similarity of Appearance (Threatened), C=Candidate, SSC=Species of Special Concern, CH=Critical Habitat.				

Socioeconomic Resources

Alligator Lake is surrounded by Grayton Beach State Park except for the Gulf Trace subdivision on the southwest side and is within a half mile of the Gulf of Mexico. Several beach access points are located along the road's entire length. County Road 30A crosses the lake in an east-west direction and divides the lake into north and south portions.

Alligator Lake is in the Santa Rosa Beach census block, which includes the community of Grayton Beach and City of Santa Rosa Beach. The census block is 97 percent white, less than three percent Hispanic, and blacks, Asians, and others make up less than one percent of the population. About 93.7 percent of people in the county are high school graduates or more and more than 42 percent of individuals have college degrees. Only 6.2 percent of the census block was living below the poverty level. Nearly 90 percent of the census block is white, followed by 2.5 percent Asian, 6.0 percent black, and less than one percent of any other race. Median household income in this census block ($60,439) is higher than in the State of Florida ($48,900) and the U.S. ($55,322).

4.7.4.2 Environmental Consequences

Only those resource areas for which potential impacts are expected are discussed in detail in for this alternative. The FL TIG analyzed the following resources in more detail below:

- **Physical Resources** – Geology and Substrates, Hydrology and Water Quality
- **Biological Resources** – Habitats, Wildlife Species, Marine and Estuarine Fauna, Protected Species
- **Socioeconomic Resources** – Socioeconomics, Land and Marine Management, Tourism and Recreational Use, Aesthetics and Visual Resources.

Physical Resources

The project would restore tidal exchange, including salinity exchange, between the upper and lower portions of Alligator Lake by replacing the existing road culverts with a bridge, thereby opening the connection between the upper and lower lake. Restoring the hydrologic connection would improve water quality in the upper lake by restoring the mechanisms than allow the variation in salinity and the transport of sediment from the upper to the lower lake and into the Gulf, where the sand becomes part of the sediment source to Gulf barrier islands. The restored freshwater flow into the lower lake would reduce salinities, restore sediment exchange, and help to restore intermittent estuarine conditions characteristic of (and unique to) these coastal dune lakes. Long-term benefits to water quality are anticipated as a result of the project. Re-establishing the hydrologic connection between the upper and lower portions of Alligator Lake would restore the natural exchange of saltwater and sediments and re-establish the volume of water the lake can accommodate during storm surge, thereby reducing flooding.

Temporary and short-term impacts to water quality in both the upper and lower lakes during construction would be expected and would be avoided by using BMPs. During construction, BMPs and required stormwater and erosion control measures would be implemented to avoid adverse impacts to drainage basins, floodplains, surface waters, or ground water resources. An NPDES stormwater construction permit would be obtained prior to construction activities and permit requirements would be implemented accordingly. Wetland mitigation needs would be assessed during the Florida Environmental Resource Permit, USACE Section 404 Permit, and the Application for Works in the Waters of Florida processes. Roadway improvement activities would meet federal and state regulations for increased stormwater management, creating long-term beneficial impacts to water resources. construction and stormwater permits as required. These permits would include an Erosion, Sedimentation, and Pollution Control Plan which would require the implementation of site-specific management actions and BMPs, such as planting vegetation, and employing silt fencing, sand bags, rock bags, sediment traps, sediment basins, synthetic bales, and floating and staked turbidity barriers. These measures would help ensure that road and bridge construction activities do not create erosion, sedimentation, or siltation, which could negatively impact individual species and their habitat.

In summary, the project is anticipated to result in short-term minor adverse impacts and long-term benefits to physical resources.

Biological Resources

Temporary short-term impacts to shoreline habitats and associated fish and wildlife that have become established along CR30A as a result of the reduced hydrologic connection between the upper and lower lake would occur during construction and these same shoreline habitats would be eliminated once the bridge is constructed and the hydrologic connection is re-established. Birds would be disturbed and move to other areas in the region during construction activities and would also not be adversely affected. Temporary short-term adverse impacts to reptiles such as gopher tortoises, indigo snakes, and American alligators would be expected during construction if these animals are present. Surveys for these species would be undertaken prior to construction and if animals are present, consultation would be undertaken with the FWC to relocate animals and avoid adverse impacts. Strictly freshwater fish and amphibians, intolerant of even low salinities, would be adversely affected by the project once a

connection with the Gulf is established. However, these species would be replaced by others that are adapted to the estuarine conditions and the forage value of the lake for birds would not likely be adversely affected. The lake drains directly to the Gulf and is not connected in any way to Choctawhatchee Bay or River. Consequently, no impacts to Gulf sturgeon or other anadromous fish species (e.g., Alabama shad, striped bass) are anticipated. Beach mice occur in the dunes and swales along the beach, located approximately a half mile south of the project area, and are not expected to be adversely impacted by construction or other road activities beyond existing conditions. Adjacent Grayton Beach State Park also provides refuge for any animals disturbed by construction activities. However, beach mice seek refuge in scrub communities inland of beaches in the case of strong storms and flooding. The FL TIG has begun coordinating with the relevant regulatory agencies related to potential impacts to protected species and habitats.

Long-term benefits to fish and wildlife, and habitats are anticipated as a result of the project. Re-establishing the hydrologic connection between the upper and lower portions of Alligator lake would restore the natural corridor available to species that use both estuarine and freshwater habitats.

The project would not widen the existing CF30A or create additional development, therefore no loss of natural habitat would occur in the project area. The project would restore historic intermittent estuarine conditions in Alligator Lake and therefore restore the natural biological variation in fish and wildlife that occurs in estuarine systems. The lake would shift from having an upper impounded freshwater portion and lower saltwater lake to one that is characterized by a gradient of freshwater to marine conditions, depending on rainfall and conditions in the Gulf. The diversity of fish and wildlife using Alligator Lake would likely increase, providing wading bird habitat for both freshwater and estuarine species and support more fish species. Pre- and post-restoration monitoring would be conducted and continued via a cooperative project between Walton County, Choctawhatchee Basin Alliance (CBA), and the University of Florida LAKEWATCH. Monthly sampling includes total phosphorus, total nitrogen, chlorophyll, water clarity, color, temperature, oxygen, salinity, turbidity, and pH. Additional data would be used to evaluate the success of the restoration project by comparative analysis.

In summary, the project is anticipated to result in short-term minor adverse impacts and long-term benefits to biological resources.

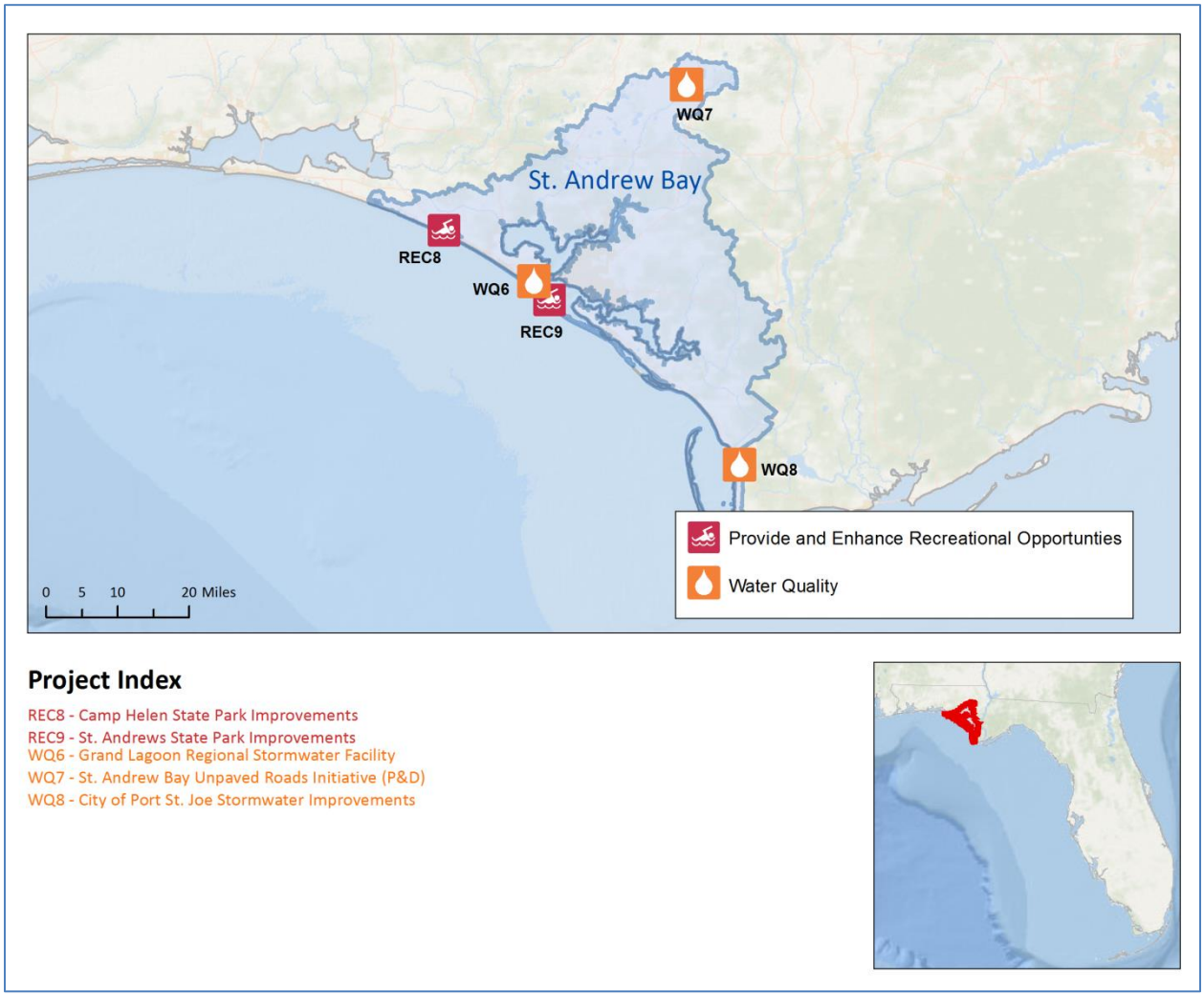
Socioeconomic Resources

The project would be expected to result in short-term increase in construction jobs. Since CR30A would not be widened, no additional traffic would be anticipated. Long-term maintenance would be managed by Walton County. No long-term adverse economic impacts are anticipated as a result of the project.

In summary, the project is not anticipated to adversely impact socioeconomic resources and would likely result in short-term benefits.

4.8 St. Andrew Bay Watershed

Figure 4-15 Projects in St. Andrew Bay Watershed



As shown in figure 4-15, five projects are located in St. Andrew Bay watershed:

- REC8, Camp Helen State Park Improvements;
- REC9, St. Andrews State Park Improvements;
- WQ6, Grand Lagoon Regional Stormwater Facility.
- WQ7, St. Andrew Bay Unpaved Roads Initiative (P&D) ; and
- WQ8, City of Port St. Joe Stormwater Improvements .

The assessment for St. Andrew Bay Unpaved Roads Initiative (P&D) (WQ7) projects is included under section 4.3 Alternatives Proposed for Planning and Design.

4.8.1 Area Overview

The St. Andrew Bay watershed includes about 1,156 square miles in the central portion of the Florida Panhandle, primarily in Bay (62 percent) and Gulf (20 percent) counties and is the only major watershed in northwest Florida located entirely within the state of Florida. It is also the only watershed with no major river. The watershed is east of the Choctawhatchee River watershed and west of the Apalachicola River and Bay watershed. St. Andrew Bay, West, North, and East bays; St. Joseph Bay; and Econfina Creek and its groundwater contribution area; and Deer Point Lake Reservoir, Lake Powell and several other coastal dune lakes, and contributing basins and tributaries are all in the watershed.

The St. Andrew Bay SWIM Plan, updated in 2017 (NWFWMD 2017d) provides a detailed description of the watershed and the watershed level information presented here is summarized from the SWIM Plan unless otherwise cited. The SWIM Plan outlines priorities in the watershed, including: water quality impairments, especially in Deer Point Lake Reservoir, Grand Lagoon, West Bay, and St. Joseph Bay; wastewater management; nonpoint source pollution due to stormwater runoff and sediments from unpaved roads; wetland loss and degradation; and vulnerability of seagrasses, coastal dune lakes, shoreline stabilization; springs; and floodplains in the watershed. The preservation of the groundwater contribution area for springs discharging into Econfina Creek to protect water quality and quantity in Floridan aquifer springs, Econfina Creek, Deer Point Lake Reservoir, and receiving waters in the St. Andrew Bay estuary is a primary focus in the watershed.

4.8.1.1 Physical Resources

Elevations in the watershed range from 8 feet below MSL along river and creek beds to a high of approximately 328 feet above MSL in the norther portion of the watershed in Jackson County. The St. Andrew Bay watershed, like the previously described watersheds, is within the Gulf Coastal Plain physiographic region, characterized by gently rolling hills, ridges, prairies, and alluvial floodplains, and underlain by sediments of sand, gravel, porous limestone, chalk, marl, and clays. Younger poorly developed soils are found along the coastline and barrier peninsulas where depositional processes are still active. The eastern half of the Panhandle (east of the Choctawhatchee River) and the vicinity of Marianna, Jackson County, is influenced by the presence of limestones near the surface which has resulted in various types of subterranean solution activity (e.g., spring formation). The upper St. Andrew Bay watershed is characterized by a limestone karst landscape and hydrologic connectivity with the Floridan aquifer through a series of springs and sinkholes, as well as the Sand Hills Lakes region, in southwest Jackson and Washington counties and northern Bay County. The Floridan Aquifer is most vulnerable to contamination in these areas due to its strong hydrologic connection to the aquifer and the area of spring recharge, population density, and proximity to estuarine waters. Although sandy soils in the St. Andrew Bay watershed have been a limiting factor in crop production, soils throughout the watershed are an important natural resource for silviculture.

Waterbodies in the watershed range from the Econfina Creek to the Deer Point Lake Reservoir, to coastal lakes and the Sandhill Lakes. Deer Point Lake is a 5,000-acre impoundment located seven miles north of Panama City that is also the major source of potable water for Bay County. Coastal dune lakes (previously described for the Choctawhatchee Bay watershed) are a conspicuous feature in the watershed and are most numerous in Walton and Bay counties. The St. Andrew Bay watershed has no

major river, but Econfina Creek is the major tributary, beginning in southwest Jackson County and flowing through Washington and Bay counties and then into the Deer Point Lake Reservoir. Other tributary streams within the St. Andrew Bay watershed include Burnt Mill, Crooked, Sandy, and Wetappo creeks. These streams drain forested uplands and wetlands and include tidal marsh within their lower reaches. Because there are no major rivers, estuarine waters in the watershed are deep, clear, and salinities are consistently high when compared with major river-dominated estuaries.

No water quality impairments are reported for the northern portion of the watershed, where the groundwater is vulnerable, and much of the area is managed by the District to protect water quality. A concentration of nonpoint source pollution sources is associated with the developed lands adjacent to the bays. Septic systems adjacent to the lakes, streams, bays, and coastal areas pose threats to water quality in the form of nutrients and other pollutants. Silvicultural activities, landscape erosion, and unpaved roads contribute to the nonpoint source pollution. The St. Joseph Bay State Buffer Preserve complements St. Joseph Peninsula State Park. A total of 37 waterbody segments in the St. Andrew Bay watershed are designated as impaired, based on Florida's Impaired Surface Waters Rule, Chapter 62-303, FAC. Waterbody segments verified as impaired, based on sufficient data and identified causative pollutants, form the list of waters for which Total Maximum Daily Loads (TMDLs) would be developed. Water quality impairments for listed stream and estuarine waters include nutrients, dissolved oxygen, and bacteria. Most of the estuarine waters are listed as impaired for bacteria, and West Bay, East Bay, North Bay, St. Joseph Bay, Grand Lagoon, and Rattlesnake Lake are listed for nutrients. Sandy Creek is impaired for dissolved oxygen. The 2016 updated list displayed a significant reduction in listed impaired waterbody segments, due in part to the adoption of an approved TMDL for mercury. The primary source of mercury pollution in the environment is atmospheric deposition. Highly erodible soils, unstable slopes, and high rainfall intensities are important factors in erosion and sedimentation. Construction activities, unpaved roads, abandoned clay pits, and agricultural and silvicultural practices lacking proper BMPs are common sources of sedimentation.

Marinas may be sources of nonpoint source pollution from activities such as boat maintenance, fueling, and marine sewage discharge, as well as runoff from parking lots. Major marinas are located at St. Joseph Peninsula State Park, Port St. Joe, the Naval Support Activity, Panama City Beach at Grand Lagoon, St. Andrews State Park, Panama City (on Harrison Avenue and on Bayview Avenue), and Sun Harbor near the Panama City Port Authority. Several marinas in the St. Andrew Bay watershed are clean marina certified (FDEP 2015b). Most oxidized-nitrogen emissions are deposited close to the emission source and can especially impact surface water proximate to urban areas. Stormwater runoff is the primary source of nonpoint source pollution, and it is closely associated with land use. For example, fertilizer application, ditching, road construction, and harvesting associated with agriculture and silviculture are a source of nonpoint source pollution, erosion, sedimentation, and physical impacts to streams and lakes in the watershed. Other sources of water quality degradation in the watershed include OSTDS, septic tanks, stormwater conveyance systems, marinas (boat maintenance, fueling, etc.), domestic wastewater facilities, mining operations, landfills, and legacy pollution from dry cleaning, military, and industrial operations. For example, a total of 381 active sites are registered with the Storage Tank and Petroleum Contamination Monitoring (STCM) database and five contaminated dry-

cleaning sites eligible for the state-funded Dry-cleaning Solvent Cleanup Program. Most STCM and dry-cleaning sites are in historically developed areas, including Panama City, Panama City Beach, and Port St. Joe.

4.8.1.2 Biological Resources

The St. Andrew Bay watershed supports a number of natural communities. Terrestrial communities in the watershed include bluffs, mesic flatwoods, sandhill, scrub, scrubby flatwoods, upland hardwood forests, wet flatwoods, xeric hammocks, and coastal strands. SAV beds; tidal marshes; karst lakes and streams; springs, wetland forests; coastal dune lakes; sand hill lakes; and other wetland and aquatic habitats collectively supporting populations of fish, invertebrates, migratory birds, and other flora and fauna. A total of 3,643 species of plants and animals reportedly occur within the watershed. Wetlands and floodplains in the watershed capture and release stormwater runoff, buffering potential impacts to water quality and flooding, and recharging aquifers and potable water supplies. Lakes, streams, and coastal waters in the watershed support numerous species of fish, shellfish, and wildlife.

Palustrine wetlands define much of the landscape and ecology of the western portion of the watershed associated with West Bay and the drainage of East Bay, including along Wetappo Creek and Horseshoe Creek. Wet pine flatwoods, cypress strand, basin marsh, baygall, dome swamp, hydric hammock, floodplain swamp, and wet prairie are the prominent wetland habitats found in the St. Andrew Bay watershed. Marshes in the watershed include both salt (brackish) marsh in the coastal reaches and freshwater emergent marsh along stream systems. Generally, salt marshes are intertidal and develop along relatively low energy shorelines. Salt marshes in the Florida Panhandle are usually characterized by fairly homogeneous expanses of dense black needlerush (*Juncus roemerianus*). Often, they are accompanied on the water-ward side by smooth cordgrass (*Spartina alterniflora*). Large areas of tidal marsh occur along the Breakfast Point peninsula and West Bay, the southern and eastern shorelines of East Bay, and along the southern shoreline of St. Joseph Bay. Marsh vegetation is also an important component of the littoral zone within many of the bayous and Grand Lagoon.

SAV supports an abundance of fish and invertebrates, many of which are commercially and recreationally important. St. Andrew Bay and St. Joseph Bay are dominated by turtle grass (*Thalassia testudinum*), shoal grass (*Halodule wrightii*) and manatee grass (*Syringodium filiforme*). Due to limited freshwater influence (and therefore reduced sediment load), St. Andrew and St. Joseph bays are relatively clear compared to other coastal waterbodies in northwest Florida, making them ideal habitat for SAV communities. Data from 2010 indicate that SAV beds covered approximately 12,193 acres in the St. Andrew Bay estuary and 7,166 acres in St. Joseph Bay.

The St. Andrew Bay watershed has several named coastal dune lakes that are important stopover points for migrating neo-tropical birds, habitat for aquatic and marine animals, freshwater for aquatic plants, and recreational resources for residents and visitors. Wet flatwoods and drainage channels in and proximate to the City of Panama City are home to the Panama City Crayfish (*Procambarus econfinae*), a Species of Special Concern and species endemic to Bay County, Florida. The Econfina Creek includes designated Critical Habitat for several threatened or endangered mussels (potentially occurring federally threatened and endangered species are listed for each project in the following sections).

In addition to native species, the FWC Invasive Plant Management Section is the lead agency for coordinating control of invasive aquatic and upland plants on public conservation lands and surface waters in the state and list several invasive species of management concern in the watershed. Cuban bulrush (*Oxycarym cubense*) and giant salvinia (*Salvinia molesta*) have been documented in Deer Point Lake Reservoir. Additionally, the introduced Indo-Pacific lionfish (*Pterois* spp.), which outcompete native fish species for prey and habitat, has been reported in both St. Joseph and St. Andrew bays.

4.8.1.3 Socioeconomic Resources

Population in the watershed has increased significantly: from approximately 134,705 in 1990 to 180,296 in 2010, a nearly 34 percent increase over 20 years. Population over the next twenty years (2010-2030) is projected to increase by perhaps 20 percent, with continuing changes in land use and increasing demands on wastewater and stormwater management systems. These changes require continuing cooperative efforts on the part of the state, regional and local governments, and the communities they serve. The actions taken now serve to both address current problems and continue to build the foundation for future efforts.

Bay County is similar demographically to Florida and the U.S. as a whole, as shown in Appendix D. The percent of white individuals in Bay County (82.2 percent) is slightly higher than for the State of Florida and the U.S., both approximately 77 percent (U.S. Census Bureau 2018). Across all three geographic areas the percent of the population (aged 25 or older) with a high school education or higher is between 88 and 89 percent. The percent of the population (aged 16 or older) in the labor force in Bay County (59.7 percent) is similar to that of the State as a whole (58.5 percent) and lower than that for the U.S. (63.1 percent; U.S. Census Bureau 2018). This pattern also holds true when considering median household income, with Bay County and Florida State being slightly lower than the U.S. The percent of the population living in poverty is slightly higher in Bay County (14.9 percent) than is typical in Florida and the U.S. (14.7 percent and 12.7 percent respectively; U.S. Census Bureau 2018).

Gulf County has a population of 16,160. Gulf County is demographically slightly worse off than Florida and the U.S. as a whole, as shown in Appendix D. The percent of white individuals in Gulf County (78.8 percent) is similar to the State of Florida and the U.S., both approximately 77 percent (U.S. Census Bureau 2018). The percent of the population (aged 25 or older) with a high school education is 82.5 percent lower than the State of Florida and for the U.S. (both 87 percent). The percent of the population (aged 16 or older) in the labor force in Gulf County (45.0 percent) is lower than the State and U.S. levels (58.5 percent and 63.1 percent respectively) (U.S. Census Bureau 2018). Median household income ($40,822) is lower than both the U.S. ($55,322) and Florida ($48,900). The percent of the population living in poverty is higher in Gulf County (23.5 percent) than is typical in Florida or the U.S. as a whole (14.7 percent and 12.7 percent respectively; U.S. Census Bureau 2018). Gulf County has experienced relatively slow growth accompanied by a minimal tourism base, which can be attributed to large land ownership patterns and minimum employment opportunities. In the past, the County's economy was dominated by the paper mill in Port St. Joe until the early 1990s when several mills experienced shutdowns and the For six decades, the St. Joe Paper Company grew and harvested pines in the panhandle and turned them into pulp at its mill in Port St. Joe. Port St. Joe mill was closed in 1998. Soon after, Gulf County was designated as a "rural area of economic concern" in Florida. Since the 1990s

however, the shift in the county's economy from a paper production related industry to a tourism industry has resulted in a steady increase in the number of tourists. The increase in tourism has brought about a demand for homes. Coastal development within Gulf County is primarily related to the construction of beach vacation homes that are typically used as rental property throughout much of the year. In the mid-1990s the St. Joseph Peninsula State Park saw a 50 percent increase in number of annual visitors and in 2002, the park was named Top American Beach. Promotional marketing has brought about slogans such as, Florida's Forgotten Coast, Florida's Great Northwest, and Pearl of the Panhandle. Increasing national familiarity has continued to bring visitors to the area and the population continues to steadily increase.

4.8.2 REC8, Camp Helen State Park Improvements (Preferred)

Camp Helen State Park is a 180-acre park bordered by Gulf of Mexico to the south and Lake Powell on the north and east, in Bay County, Florida. The parcel is divided into north and south parcels by U.S. Highway 98 (Figure 4-16). Specifically, the project would include:

- Construction of turn lanes to a 400-foot controlled-access entrance road, a 20-space parking area, a boardwalk, three picnic pavilions, and a 10-fixture restroom;
- Construction of two improved docks to access to Lake Powell (one for paddle-craft and one for power craft) and associated walkway extensions to connect existing walkways to the docks.

These additions would enhance the public's access to the surrounding natural resources and enhance recreational experiences. The action area for the project does not include the Gulf coast portion of the park or marine habitat areas. Additional details on the project are provided in Chapter 2 (Section 2.5.4).

During construction, BMPs and boom placement along with other avoidance and mitigation measures required by state and federal regulatory agencies would be employed to minimize any water quality and sedimentation impacts. Specific mitigation measures would be implemented during construction to minimize erosion and overall soil impacts. These would include using existing development footprints, following established BMPs for construction activities such as the implementation of an erosion control and stormwater management plan, the installation of sediment traps prior to commencement of construction activities, and ongoing construction monitoring to ensure compliance (see Appendix E of the Phase V ERP/EA for a list of potential mitigation measures and BMPs that would be undertaken, as appropriate).

Figure 4-16 Camp Helen State Park Proposed Improvements

4.8.2.1 Affected Environment

Physical Resources

The park is predominantly flat, on a geological formation called the Apalachicola Embayment, located in the St. Andrew Bay watershed and bordered by Lake Powell and the Gulf of Mexico. Soil in the area has been classified as predominantly Kureb, Direго muck, beaches and sands (e.g., Lakeland, Freipp-Corolla, Mandarin; USDA NRCS 2018). These soil types are composed primarily of sand. The improvements are proposed for soils classified as Lakeland and Kureb sand. Lake Powell is a coastal dune lake, that is largely freshwater, but is occasionally (approximately six times per year) opened to the Gulf of Mexico

via and inlet (Philips Inlet), which allows for tidal exchange. Lake Powell is designated as an OFW. Lake Powell has no major freshwater inputs. As such, precipitation is the primary freshwater source to the lake. The lake is relatively shallow. The park contains multiple FEMA designated Flood Zones (FEMA 2018). Most of the improvements on the northern parcel are located in Zone X, areas of minimal flood hazard. Most of the improvements on the southern parcel are located in Zone VE and Zone AE, with a flood elevation of 9-10 feet.

Biological Resources

Habitats at the site consist of scrub shrub, dunes, scrub oak forests, mesic flatwoods, maritime hammock, swamp, and marsh (FDEP 2014a). The environment in the northern parcel is mostly undeveloped and consists of forested areas and scrub habitat. The southern parcel is largely beach and dune habitat, coastal grassland, salt marsh, mesic flatwoods, wet flatwoods, depression marsh, and maritime hammock, and forested areas with some understory vegetation. There are various estuarine, palustrine, and marine wetland designations (based on the most updated wetland assessment; USFWS 2018b) within Camp Helen State Park. There are populations of Godfrey's golden aster and gulf lupine. There have been invasive species noted at the site (e.g., Chinese tallow trees, mimosa, cogon grass, Torpedo grass) and removal and treatment efforts are ongoing at the park.

Based on available information, it is unknown if there are any SAV in the waters of Lake Powell off of Camp Helen Park (Google Maps 2018; NOAA OR&R, UNH, and USEPA 2018). EFH for coastal migratory pelagic fish, stone crabs, reef fish, and shrimp is present in the Gulf of Mexico to the south of the park outside of the action area for the project (NOAA OR&R, UNH, and USEPA 2018).

Fish and wildlife potentially present in and around the site include migratory birds and select aquatic and terrestrial protected species. Migratory birds could potentially use this site for nesting, foraging, roosting, and breeding. Potential migratory bird groups include wading birds (e.g., herons, egrets), shorebirds (e.g., terns, plovers, skimmers), raptors (e.g., hawks, bald eagles, kites), and songbirds (e.g., sparrows, warblers, woodpeckers). There is potential for bald eagles to be present at this site (USFWS 2018a). Although these species could occur on the parcel, they are not known to inhabit or nest in the action area or in the nearby vicinity.

The list of federally threatened, endangered, proposed, candidate, and other species of concern for this site, as identified through USFWS IPaC, is presented in Table 4-24 (USFWS 2018a). There is no terrestrial critical habitat in the action area for the project. While there is marine critical habitat for Gulf sturgeon on the Gulf of Mexico boundary of Camp Helen State Park, it is outside of the project action area (Unit 11; NOAA OR&R, UNH, and USEPA 2018). A list of all state and federally listed species found in this watershed is presented in Appendix E.

Table 4-24 Federally listed species potentially occurring in the Camp Helen State Park Improvements project area

Common Name	Scientific Name	Habitat	Status	Likelihood
Reticulated flatwoods salamander	*Ambystoma bishopi*	Palustrine: wet flatwoods, dome swamp, basin swamp, Terrestrial: mesic flatwoods (reproduces in ephemeral wetlands within this community).	E	Unlikely
Piping plover	*Charadrius melodus*	Estuarine: exposed unconsolidated substrate Marine: exposed unconsolidated substrate Terrestrial: dunes, sandy beaches, and inlet areas; mostly wintering and migrants.	T	Likely
Red knot	*Calidris canutus rufa*	Estuarine: bays, tidal flats, salt marshes Terrestrial: sandy beaches Marine: aerial, near shore.	T	Likely
Choctawhatchee beach mouse	*Peromyscus polionotus allophrys*	Terrestrial: sand dunes with a moderate cover of grasses and forbs.	E	Likely
West Indian manatee	*Trichechus manatus*	Estuarine: SAV, open water marine: open water, SAV.	T	Unlikely
Note: Species determined to be "Unlikely" to be found in the action area are not addressed further in this analysis. E=Endangered, T=Threatened, SAT=Similarity of Appearance (Threatened), C=Candidate, SSC=Species of Special Concern, CH=Critical Habitat.				

Socioeconomic Resources

Camp Helen State Park is managed by FDEP Division of Recreation and Parks. Tourists pay an entrance fee to use the park amenities that include restrooms, trails, and access to fishing, boating, and swimming. Recreational angling is significant in the Florida panhandle and is primarily conducted from boats, shorelines, and piers at and near the site. Currently, there is no official access road to the northern section of the park. Existing infrastructure on the north parcel includes a boardwalk, but no additional development. Infrastructure on the south parcel includes historic structures, and a pumphouse, cottages, kitchen, visitors center, walking trails, parking lot, a former boathouse on Lake Powell, and a former pier on the Gulf of Mexico (destroyed by hurricanes in 1975 and 1995, but some pilings remain). There are no designated protected viewsheds in the vicinity of this project. On Lake Powell, the remnants of a dock are visible along with shoreline infrastructure.

4.8.2.2 Environmental Consequences

Only those resource areas for which potential impacts are expected are discussed in detail in for this alternative. The FL TIG analyzed the following resources in more detail below:

- **Physical Resources** – Geology and Substrates, Hydrology and Water Quality
- **Biological Resources** – Habitats, Wildlife Species, Marine and Estuarine Fauna, Protected Species
- **Socioeconomic Resources** – Socioeconomics, Land and Marine Management, Tourism and Recreational Use, Aesthetics and Visual Resources.

Physical Resources

Implementation of this alternative could include use of heavy construction equipment, such as bulldozers, barges, trucks, backhoes, tractor trailers, cranes, small barges with crane, small excavators, fork lifts, asphalt machine, roller, small power tools, generators, small trucks, and hand tools. Most of the area where these amenities would be constructed has seen previous and ongoing disturbances and development.

This project would include in-water work in the south parcel in Lake Powell, for the construction of a paddle-craft launch and dock. The overwater area of the amenities would be dependent upon final design, but for purposes of this RP/EA, the paddle-craft launch is assumed to be up to 550 square feet; and boat dock is assumed to be around 2,115 square feet. Dock and paddle-craft launch construction would include placement of new pilings using the least invasive techniques (e.g., jetting, pushing, or driving the piles) where possible, but could use impact hammers, given substrate and construction cost considerations. In-water dredging or digging associated with installation of the pilings for the docks is not anticipated, though substrate displacement and compaction from dock and paddle-craft launch piling installation would be expected. Depth would be subject to final design, but there would a small volume of substrate (less than 50 square feet) displaced in Lake Powell from the paddle-craft and boat dock. During construction, BMPs and boom placement along with other avoidance and mitigation measures required by state and federal regulatory agencies would be employed to minimize any water quality and sedimentation impacts.

Digging would also occur in the terrestrial environment, over approximately five acres (three acres in the north parcel and two acres in the south parcel). Construction and digging activities, including staging areas for construction equipment, would utilize existing development footprints and disturbed areas where possible (e.g., current paved areas), but digging and staging equipment would disturb some soils. The restrooms onsite would need connections to the septic system. The specific needs would be determined during final designs. The boardwalks and trails would use existing trails and disturbed areas, where possible, to minimize impacts. Although development of nature trails would impact soils, the trails would direct and condense foot traffic into designated areas, minimizing adverse impacts. The depth of digging and disturbance depends on final engineering design, but for additional parking spaces, is anticipated to be less than one foot. Terrestrial work that may affect hydrology and water quality includes construction of additional impervious surfaces such as bathrooms, parking, or roads if infrastructure is created outside of using existing infrastructure. Additional impervious surfaces would alter onsite stormwater run-off. Pervious pavement would be used in the parking area to minimize runoff and potential water quality impacts if feasible. Construction of the parking and restroom facilities and the removal of road debris may temporarily impact water quality.

Specific mitigation measures would be implemented during construction to minimize erosion and overall soil impacts. Ground disturbances from construction of proposed improvements, impervious surfaces, and site preparation activities would have short-term minor and long-term adverse impacts on geology, substrates, hydrology and water quality.

In summary, the project would have short- and long-term minor adverse impacts to physical resources.

Biological Resources

Construction activities in water and on land associated with this alternative could result in short-term impacts to aquatic habitat due to erosion and increased turbidity during construction. The release of sediments during in-water and terrestrial construction would be controlled using BMPs and mitigation to protect aquatic habitats, prevent the transport of sediment into waterways, confine impacts to construction sites, and minimize the magnitude of the impacts on water quality in Lake Powell. Any work in waters of the U.S., including wetlands, associated with this alternative would be coordinated with the USACE pursuant to Section 404 of the CWA. Coordination with the USACE and final authorization pursuant to CWA/RHA would be completed prior to final design and construction. USACE and NMFS construction guidelines would be followed, where possible, regarding dock and launch construction (USACE and NMFS 2001); however, final placement and design would include considerations for ADA compliance.

In-water and terrestrial improvements would avoid wetlands to the extent practical and feasible and are subject to regulatory consultations and final design. A SAV survey would be conducted between June 1 and September 30 in the locations proposed for the dock/kayak launch locations prior to construction. The results of the SAV survey would be provided to NMFS Habitat Conservation Division for review and comment so as to ensure there would be no effects on EFH. Based on the in-water work contained in Lake Powell and upland nature of construction activities, there are no anticipated effects to EFH. Specific conservation and mitigation measures would be implemented during the finalization of engineering and design plans and construction to minimize erosion and overall habitat impacts.

Construction equipment and staging areas could impact habitat, but as noted previously, these would be sited on existing development footprints where possible to minimize impacts. Although the picnic area and nature trails could potentially impact habitats and biological resources (e.g., clearing of vegetation for nature trails), most of the improvements are proposed for currently disturbed areas and areas with grasses and vegetative understory. Additionally, the trails would direct and condense foot traffic into designated areas, benefitting habitats and species over the long-term. To mitigate potential impacts to the dune habitat from the construction of a boardwalk and trails, the Conservation Measures for Dune Walkover Construction (USFWS 2017) would be implemented during final design and construction.

The FL TIG would coordinate with the USFWS and review this alternative for impacts to bald eagles and migratory birds in accordance with the Bald and Golden Eagle Protection Act (BGEPA) of 1940 (16 U.S.C. §§ 668–668d) and the Migratory Bird Treaty Act of 1918 (MBTA) (16 U.S.C. §§ 703–712) to ensure that appropriate conservation measures and BMPs would be incorporated into the project.

To the extent possible, construction activities would avoid specific habitat locations onsite if there are known nesting birds and avoid nesting seasons. Pre-construction nesting surveys for migratory birds and raptors would be conducted and if evidence of nesting is found, the FL TIG would coordinate with the USFWS to develop and implement appropriate conservation measures. At a minimum, trees/shrubs with active nests would be flagged and avoided. To avoid or minimize impacts to migratory birds from increased human activity, trails would divert and concentrate recreational users away from any important nesting, foraging, or rookery locations including shorelines where shoreline restoration would

occur and minimal removal of trees. Additionally, signage would be installed along trails, boardwalks, and picnic locations to provide users information on sensitive species in the area and actions to take to avoid or minimize impacts to sensitive species. Foraging and resting birds may temporarily be displaced during construction or recreation activities. Bird roosting would not be affected because construction activities and most human use would occur during daylight hours.

The FL TIG has begun coordinating with the relevant regulatory agencies related to potential impacts to protected species and habitats. Conservation measures recommended during consultation would be incorporated into final project design and implementation to avoid and/or minimize impacts to protected species and critical habitats. Specific conservation measures would also be implemented during construction to avoid and minimize disruption and overall impacts to protected species. Below is a list of potential protected species at Camp Helen, effects from the project activities, and potential conservation measures.

Red knot and piping plover: The red knot and piping plover do occur on this parcel; some that occur are tagged. There is suitable habitat present on the southern part of the park for these species, along the shoreline and in the dunes. If construction occurs during the summer months (approximately May to August), the two species are not generally present along the Gulf coast. However, construction may need to occur in other months which could generate construction noise and disturbance to resting and foraging birds, should they be present on the site. This project is not expected to have any direct or indirect adverse effects on red knot and piping plover. If disturbed while foraging during construction activities, these birds can move to suitable habitat nearby to continue foraging and resting. Therefore, this project component could have short-term minor indirect adverse effects on red knot and piping plover.

Choctawhatchee beach mouse: This site is considered part of their historic range, but they have not been documented at Camp Helen State Park. While the habitat at the park could support the Choctawhatchee beach mouse, they are not known to occur at the site recently (a FWC survey was conducted in 2011-2012; FDEP 2014a). If suitable habitat, burrows, or other evidence of the beach mouse is discovered within the action area during siting activities, the final design would be adjusted to avoid habitat fragmentation. If discovered onsite during construction, all construction would be halted and USFWS would be contacted. As such, this alternative would not likely adversely affect this species.

Short-term as well as long-term adverse impacts to biological resources would occur onsite as a result of construction and site preparation activities. Long-term impacts associated with habitat and wildlife disturbance from visitors on the site are anticipated to be minor. This project is not expected to have any significant adverse effects on floodplains.

In summary, because the construction activities would be localized to the site and habitat fragmentation would be limited, impacts from the project to biological resources would be minor, adverse, short- and long-term.

Socioeconomic Resources

The project would be expected to result in short-term increase in construction jobs. During the construction phase of this project, construction equipment and operations would likely be located along and in previously disturbed areas and parking lots. These construction equipment and materials may temporarily impact aesthetics and visual quality of the site. These impacts result from the presence of equipment, barriers and construction-related dust and emissions. Short-term closures of public areas may be required to accommodate construction activities, which could adversely affect visitors.

Over the long-term, the dock and paddle-craft launch that would be constructed as part of this project would impact the appearance of the land from the water, creating a more developed appearance. From the public perspective, the site would be managed as it is at present, as a state park, and improvements should enhance visitor experiences at the park.

In summary, the project is anticipated to result in short-term minor adverse impacts to existing infrastructure and utilities, tourism and recreation, and aesthetics and visual resources. However, the project improvements would provide benefits and amenities to park visitors over the long-term.

4.8.3 REC9, St. Andrews State Park Improvements (Preferred)

St. Andrews State Park is a 1,167-acre park in Bay County bordered by the Gulf of Mexico and Grand Lagoon in St. Andrew Bay. St. Andrews State Park is split by the inlet to St. Andrew Bay, with approximately 400 acres on the mainland and the remaining acreage on Shell Island. All of the proposed improvements for this project are on the mainland parcel of St. Andrews State Park (Figure 4-17). Specifically, the project would include:

- Construction of multiple entry lanes to reduce the extent of vehicle stacking, especially for campers (entry lanes are likely to be asphalt);
- Construction of a new entrance station to serve both day-use entry and camper registration;
- Enhancement of the Lagoon Use area by constructing a floating paddle-craft launch (likely less than 1,000 square feet), 18-fixture restroom area (approximately 42 x 34 feet), including parking area travel lane improvements, and two pavilions (approximately 20 x 30 feet each);
- Construction of a loop trail in buttonbush marsh, including a boardwalk (approximately 8,100 linear feet);
- Expansion and improvement of existing parking areas, including concrete sidewalks to connect amenities;
- Repaving of park roadways (approximately 2.05 miles, including Park Drive), and the addition of bike lanes and culverts to help restore natural hydrology.

These additions would enhance the public's access to the surrounding natural resources and enhance recreational experiences. Additional details on the project are provided in Chapter 2 (Section 2.5.4).

Figure 4-17 St. Andrews State Park Proposed Improvements

4.8.3.1 Affected Environment

Physical Resources

The park is predominantly flat in the Gulf Coast Lowlands geomorphic province, located in the St. Andrew Bay watershed and bordered by Grand Lagoon, the inlet to St. Andrew Bay, and the Gulf of Mexico. Soil in the area has been classified by the USDA NRCS as predominantly Fripp-Corolla, Bayvi loamy sand, Osier fine sand, and beaches. These soil types are composed primarily of sand. St. Andrew Bay is a high salinity estuary with no major freshwater inflow. Grand Lagoon has no major freshwater inputs. Grand Lagoon off of the park is relatively shallow, with waters not exceeding 18-30 feet. The

channel is dredged at the entrance to St. Andrew Bay, and the waters are fairly shallow on the Gulf of Mexico side. St. Andrews Aquatic Preserve is located adjacent to the Gulf of Mexico site of St. Andrews State Park; this preserve does not extend north into the bay. There are various estuarine, palustrine, pond, and marine wetland designations (based on the most updated wetland assessment; USFWS 2018b) within St. Andrews State Park. The park contains multiple FEMA designated Flood Zones (i.e., Zone AE, Zone VE, and Zone A; FEMA 2018). Most of the improvements are located in Special Flood Hazard Area Zone A and Zone AE with flood elevations in the range of 8-11 feet.

Biological Resources

The environment at the site is composed of beaches, dunes, coastal grassland, scrub shrub, wet and mesic flatwoods, and maritime hammock with some developed areas. Vegetation includes sand live oak, myrtle oak, Chapman's oak, Choctawhatchee sand pine, saw palmetto, Florida rosemary, slash pine, fetterbush, titi, saw palmetto, wax myrtle, gallberry, blueberry, and dune vegetation. The existing developed areas in the park include the entrance station, environmental interpretive center, park office, a paved road, nature trails and boardwalks, and a Gulf pier and Grand Lagoon pier. The Lagoon Use Area includes a boat ramp, fishing pier, picnic areas, and restrooms, with a parking lot nearby. There is a campground in the northwest section of the park with 176 sites, and 4 bathhouses. There are picnic pavilions and parking near the pier on the Gulf of Mexico side. In the southeast corner there are picnic pavilions, parking, restrooms, and concessions.

Based on available information, there is SAV in the waters of Grand Lagoon, both patchy and continuous beds off of St. Andrews State Park (Google Maps 2018; NOAA OR&R, UNH, and USEPA 2018). The SAV species in St. Andrew Bay are *Thalassia testudinum*, *Halodule wrightii*, *Halophila engelmanni*, and *Syringodium filiforme*. EFH for coastal migratory pelagics, stone crabs, reef fish, shrimp, and red drum is present in Grand Lagoon in or adjacent to the action area (NOAA OR&R, UNH, and USEPA 2018).

Fish and wildlife potentially present in and around the site include migratory birds and select aquatic and terrestrial protected species. Migratory birds could potentially use this site for nesting, foraging, roosting, and breeding. Potential migratory bird groups include wading birds (e.g., rails, egrets), shorebirds (e.g., terns, plovers, skimmers), raptors (e.g., bald eagles, kites), and songbirds (e.g., sparrows, warblers, woodpeckers). There is potential for bald eagles to be present at this site (USFWS 2018). Bald eagles are found at St. Andrew Bay on Shell Island (across the inlet from the action area).

The list of federally threatened, endangered, proposed, candidate, and other species of concern for this site, as identified through USFWS IPaC, is presented in Table 4-25 (USFWS 2018a). There is terrestrial critical habitat for the Choctawhatchee beach mouse (Unit 5) on the project site. The project action area would be located on the southern side of the peninsula, with the action areas occurring north of the critical habitat. While there is marine critical habitat for Gulf sturgeon (Unit 11), it is in the Gulf of Mexico, on the southern side of the peninsula, where no in-water work is proposed. A list of all state and federally listed species found in this watershed is presented in Appendix E.

Table 4-25 Federally listed species potentially occurring in the Andrews State Park project area

Common Name	Scientific Name	Habitat	Status	Likelihood
Gulf sturgeon	*Acipenser oxyrinchus desotoi*	Estuarine: various Marine: various habitats Riverine: alluvial and blackwater streams.	T	Unlikely
Reticulated flatwoods salamander	*Ambystoma bishopi*	Palustrine: wet flatwoods, dome swamp, basin swamp, Terrestrial: mesic flatwoods (reproduces in ephemeral wetlands within this community).	E	Unlikely
Eastern indigo snake	*Drymarchon corais couperi*	Terrestrial: mesic flatwoods, upland pine forest, sandhills, scrub, scrubby flatwoods, rockland hammock, ruderal.	T	Likely
Gopher tortoise	*Gopherus polyphemus*	Terrestrial: sandhills, scrub, scrubby flatwoods, xeric hammocks, coastal strand, ruderal.	C	Potentially
Green sea turtle	*Chelonia mydas*	These turtles stay near the coastline and in bays near SAV habitats. They breed adjacent to the shoreline, and nest on sandy beaches.	T	Potentially
Kemp's Ridley sea turtle	*Lepidochelys kempii*	Forage in sargassum and open waters. They breed adjacent to the shoreline, and nest on sandy beaches.	E	Unlikely
Loggerhead sea turtle	*Caretta caretta*	Forages in the open ocean and shallow coastal waters. They breed adjacent to the shoreline, and nest on sandy beaches.	T	Likely
Piping plover	*Charadrius melodus*	Estuarine: exposed unconsolidated substrate Marine: exposed unconsolidated substrate Terrestrial: dunes, sandy beaches, and inlet areas; mostly wintering and migrants.	T	Likely
Red knot	*Calidris canutus rufa*	Estuarine: bays, tidal flats, salt marshes Terrestrial: sandy beaches Marine: aerial, near shore.	T	Likely
Red-cockaded woodpecker	*Picoides borealis*	Terrestrial: mature pine forests.	E	Unlikely
Wood stork	*Mycteria americana*	Estuarine: marshes Lacustrine: floodplain lakes, marshes (feeding); Palustrine: marshes, swamps, roadside ditches.	T	Unlikely
Choctawhatchee beach mouse	*Peromyscus polionotus allophrys*	Terrestrial: sand dunes that have a moderate cover of grasses and forbs.	E	Likely
West Indian manatee	*Trichechus manatus*	Estuarine: SAV, open water Marine: open water, SAV.	T	Unlikely
Note: Species determined to be "Unlikely" to be found in the action area are not addressed further in this analysis. E=Endangered, T=Threatened, SAT=Similarity of Appearance (Threatened), C=Candidate, SSC=Species of Special Concern, CH=Critical Habitat.				

Socioeconomic Resources

St. Andrews State Park is managed by FDEP Division of Recreation and Parks. Tourists pay an entrance fee to use the park amenities that include restrooms, trails, and access to fishing, boating, camping, scuba diving, and swimming. Recreational angling is significant in the Florida panhandle and is primarily

conducted from boats, shorelines, and piers at and near the site. The action areas are located in areas zoned as Conservation and Recreation and Recreation (FDEP 2016).

The existing developed areas in the park include the entrance station, environmental interpretive center, park office, a paved road, nature trails, boardwalks, a Gulf pier, and Grand Lagoon pier. The Lagoon Use Area includes a boat ramp, fishing pier, picnic areas, and restrooms, with a parking lot nearby. There is a campground in the northwest section of the park with 176 sites, and 4 bathhouses. There are picnic pavilions and parking near the pier on the Gulf of Mexico side. In the southeast corner there are picnic pavilions, parking, restrooms, and concessions. There are no designated protected view sheds in the vicinity of this project.

4.8.3.2 Environmental Consequences

Only those resource areas for which potential impacts are expected are discussed in detail in for this alternative. The FL TIG analyzed the following resources in more detail below:

- **Physical Resources** – Geology and Substrates, Hydrology and Water Quality
- **Biological Resources** – Habitats, Wildlife Species, Marine and Estuarine Fauna, Protected Species
- **Socioeconomic Resources** – Socioeconomics, Land and Marine Management, Tourism and Recreational Use, Aesthetics and Visual Resources.

Physical Resources

Implementation of this project could include use of heavy construction equipment, such as bulldozers, barges, trucks, backhoes, tractor trailers, cranes, small barges with crane, small excavators, fork lifts, asphalt machine, roller, small power tools, generators, small trucks, and hand tools.

This project includes in-water work for the paddle-craft launch. The overwater area of the launch is dependent upon the final design, but for the purposes of this RP/EA, it is assumed to be less than 1,000 square feet. Piling installation, if required, would use the least invasive techniques (e.g., jetting, pushing, or driving the piles) where possible, but could use impact hammers, given substrate and construction cost considerations. In-water dredging or digging associated with installation of the pilings for the docks is not anticipated, though substrate displacement and compaction from piling installation would be expected. Depth would be subject to final design, but there would a small volume of substrate displaced in the marine and adjacent areas from the piling installation (approximately 35 square feet). During construction, BMPs and boom placement along with other avoidance and mitigation measures required by state and federal regulatory agencies would be employed to minimize any water quality and sedimentation impacts.

Digging would also occur in the terrestrial environment with demolition, removal, and construction of asphalt roads, sidewalks, boardwalks, parking spaces, and restrooms. Any demolition materials would be trucked offsite. Avoidance of trees and habitat are proposed, but any unavoidable tree removal or structure removal would require materials to be removed from the site via trucks. Short-term as well as long-term disturbances to terrestrial soils and substrates would occur on the park as a result of construction and site preparation activities. However, the impacts would be localized to areas of

previous development and would cover less than 10 percent of the mainland parcel of St. Andrews State Park. Construction and digging activities, including staging areas for construction equipment, would utilize existing development footprints and disturbed areas where possible (e.g., current parking areas), but digging and staging equipment would disturb some soils. The restrooms would need connections to sewer and water, but there would be minimal disturbance from this because the lines have already been extended to the former restroom. The specific needs would be determined during final designs. Although development of the boardwalk would impact soils, the boardwalk would direct and condense foot traffic into designated areas, minimizing adverse impacts. Terrestrial work that may affect hydrology and water quality includes construction of additional impervious surfaces such as bathrooms, roads, picnic pavilions, sidewalks, and parking areas. Additional impervious surfaces would alter onsite stormwater run-off. Pervious pavement would be used to minimize runoff and potential water quality impacts if feasible. Construction of the parking and restroom facilities and the removal of road debris may temporarily impact water quality. However, the proposed installation of additional culverts under the roadway and shoreline erosion control (e.g., living shoreline) could improve water quality and reduce erosion of soils at the site over the long-term.

Specific mitigation measures would be implemented during construction to minimize erosion and overall soil and water quality impacts. Construction involving ground disturbances including construction of impervious surfaces from proposed improvements and site preparation activities would have short-term minor and long-term adverse impacts on geology, substrates, hydrology, and water quality. However, there would be improvements in water quality due to shoreline erosion control activities. As such, this project may have long-term beneficial effects on water quality and substrates.

In summary, the project would have short-term and long-term adverse minor impacts as well as long-term beneficial impacts to physical resources.

Biological Resources

The improvements to the site are proposed on or adjacent to developed areas and on land that may consist of beaches, dunes, coastal grassland, scrub shrub, wet and mesic flatwoods, and maritime hammock. There are various estuarine, palustrine, and forested freshwater wetland designations (based on the most updated wetland assessment; USFWS 2018b) within the park. The proposed developments are near designated wetlands, but would avoid them where possible. However, some improvements may be proposed in designated wetlands areas, pending final design and permitting. Any work in waters of the U.S., including wetlands, associated with this alternative would be coordinated with the USACE pursuant to Section 404 of the CWA. Coordination with the USACE and final authorization pursuant to CWA/RHA would be completed prior to final design and construction. USACE and NMFS construction guidelines would be followed, where possible, regarding launch construction (USACE and NMFS 2001).

Construction activities in water and on land associated with this project could result in short-term impacts to aquatic habitat due to erosion and increased turbidity during construction. The release of sediments during in-water and terrestrial construction would be controlled using BMPs and mitigation to protect aquatic habitats, prevent the transport of sediment into waterways, confine impacts to construction sites, and minimize the magnitude of the impacts on water quality in Grand Lagoon.

In-water and terrestrial improvements would avoid wetlands to the extent practical and feasible and are subject to regulatory consultations depending on the final design. An analysis of SAV, likely via aerial imagery analysis and field survey, would be conducted between June 1 and September 30, prior to the start of construction. Depending on the results of the survey, the project may be designed to avoid or minimize impacts. Based on the paddle-craft launch being a floating dock, with potential piling installation leading up to the launch, there are minimal anticipated effects to EFH resulting from the project. Specific conservation and mitigation measures would be implemented during the finalization of engineering and design plans and construction to minimize erosion and overall habitat impacts.

Construction equipment and staging areas could impact habitat, but as noted previously, these would be sited on existing development footprints where possible to minimize impacts. The parking area, paddle-craft launch, boardwalk, and road improvements could potentially impact habitats and biological resources (e.g., clearing of vegetation), but most of the improvements are proposed for currently disturbed areas. Additionally, the boardwalk would direct and condense foot traffic into designated areas, benefitting habitats and species over the long-term.

The FL TIG would coordinate with the USFWS and review this project for impacts to bald eagles and migratory birds in accordance with the Bald and Golden Eagle Protection Act (BGEPA) of 1940 (16 U.S.C. §§ 668–668d) and the Migratory Bird Treaty Act of 1918 (MBTA) (16 U.S.C. §§ 703–712) to ensure that appropriate conservation measures and BMPs would be incorporated into the project.

To the extent possible, construction activities would avoid specific habitat locations onsite if there are known nesting birds and avoid nesting seasons. Nesting surveys are conducted annually at St. Andrews State Park and if evidence of nesting is found in action areas, the FL TIG would coordinate with USFWS to develop and implement appropriate conservation measures. The Buttonbush marsh trail would be designed to minimize construction through the marsh and elevated boardwalk sections would be constructed in marsh sections. Birds use this marsh as a rookery, so any rookeries in the marsh would be avoided. At a minimum, trees/shrubs with active nests would be flagged and avoided. To avoid or minimize impacts to migratory birds from increased human activity, tree removal would be minimized, and trails would divert and concentrate recreational users away from any important nesting, foraging, or rookery locations. Additionally, signage would be installed along the boardwalk to provide users information on sensitive species in the area and actions to take to avoid or minimize impacts to sensitive species. Foraging and resting birds may temporarily be displaced during construction or recreation activities. Bird roosting would not be affected because construction activities and most human use would occur during daylight hours.

The FL TIG has begun coordinating with the relevant regulatory agencies related to potential impacts to protected species and habitats. Conservation measures recommended during formal consultation would be incorporated into final project design and implementation to avoid and/or minimize impacts to protected species and critical habitats. Specific conservation measures would also be implemented during construction to avoid and minimize disruption and overall impacts to protected species. Below is a list of potential protected species at St. Andrews State Park, effects from the project activities, and potential conservation measures.

Choctawhatchee beach mouse and critical habitat: There is critical habitat at the site and the beach mouse is known to inhabit the site. The critical habitat is located mostly on the southern part of the park; whereas, most of the proposed improvements would be located on previously disturbed sites and locations on the northern half of the park. Hence, it is not likely that the Choctawhatchee beach mouse would be present in the action area. This species is highly mobile and is likely to leave the area during construction. However, if any of these mice are encountered onsite, construction would be halted and USFWS would be contacted. The park intends to work with FWC and USFWS to reintroduce these mice, so all construction activities and proposed improvements would be designed with the potential locations for these efforts in mind, and would avoid potential areas for reintroduction. During final design, critical habitat for the beach mouse would be avoided where possible and feasible. While this project may affect the Choctawhatchee beach mouse, it is not likely to adversely affect this species or critical habitat.

Red Knot and piping plover: These birds may be present, but unlikely to be foraging, in the action area. They may occur in the vicinity of the paddle-craft launch and other action areas during construction. If construction occurs during the summer months (approximately May to August), the two species are not generally present along the Gulf coast. However, construction may need to occur in other months which could generate construction noise and disturbance to resting and foraging birds, should they be present on the site or in action areas. If the birds are present during construction, they would likely move to another area to continue foraging or resting. Thus, while this project may affect red knot or piping plover it is not likely to adversely affect these species.

Gopher tortoise: The gopher tortoise is a terrestrial turtle that occurs in well drained sandy soils in sandhill, scrub, xeric hammock, pine flatwoods, dry prairie, coastal grasslands and dunes, and mixed hardwood pine habitats. Gopher tortoises are found at the site in the flatwoods and scrub habitats, and could potentially be in the action area. Any gopher tortoise burrows would be avoided or relocated (after consulting with USFWS) where possible and improvements in and near preferable habitat would be avoided where possible or designed to minimize impacts. As such, there may be short-term minor adverse effects on the gopher tortoise.

Eastern indigo snake: Although these species could occur on this parcel, they are not known to inhabit the site. Eastern indigo snake would likely be subject to the same removal and relocation efforts if encountered. Thus, this project is unlikely to adversely affect this species.

Sea turtles: The in-water work may increase sediments in the water column or cause acoustic issues. The in-water work is proposed for the Bay side of the park and not the Gulf of Mexico side. While sea turtles may be in this area, they are unlikely to be in the action area. As such, this project may have indirect short-term adverse effects on sea turtles during construction due to noise and disturbance of sand. As a result of these impacts, this project is unlikely to have long-term effects on sea turtles.

Gulf sturgeon and critical habitat: There is critical habitat for Gulf sturgeon (Unit 11) in the Gulf of Mexico. The action area is in St. Andrews Bay, not directly in sturgeon critical habitat, but there is the potential for sturgeon to enter the Bay. Potential impacts to the sturgeon include elevated noise levels

and the presence of suspended sediments in the water column due to construction related activities. However, sturgeon are highly mobile and can avoid any disturbances in that area by swimming away. To mitigate potential affects to sturgeon and their critical habitat, standard BMPs such as those identified in the Sea Turtle and Smalltooth Sawfish Construction Conditions (NMFS 2006) and Gulf Sturgeon Mitigation Measures, would be followed. As a result of proposed construction activities proposed for the paddle-craft launch and anticipated recreational uses, this project component may have direct or indirect adverse effects on sturgeon and may have indirect, temporary, adverse effects on critical habitat.

Short-term as well as long-term adverse impacts to biological resources would occur onsite as a result of construction and site preparation activities. Long-term impacts associated with habitat and wildlife disturbance from visitors on the site are anticipated to be minor.

In summary, because the construction activities would be localized to the site and habitat fragmentation would be limited, impacts from this project to biological resources would be minor, adverse, short- and long-term.

Socioeconomic Resources

The project would be expected to result in short-term increase in construction jobs. During the construction phase of this project, construction equipment and operations would likely be located along in previously disturbed areas and parking lots. To the extent required, the use of construction equipment, including equipment used for the movement and placement of materials (i.e., barges) and barriers enacted to protect public safety would result in some minor to moderate short-term adverse impacts on aesthetics and visual quality. These impacts result from the presence of equipment, barriers and construction-related dust and emissions. During the construction period, visible impedances would detract from the natural landscape and create visual contrast for observers visiting the project areas. The project is likely to add an additional burden on the public utilities due to increased use over the long-term. Short-term closures of public areas may be required to accommodate construction activities, which could adversely affect visitors.

Over the long-term, the infrastructure improvements included in this project would impact the appearance of the land from the water, creating a more developed appearance and provide more recreational opportunities. From the public perspective, the site would be managed as it is at present, as a state park, and improvements should enhance visitor experiences at the park.

In summary, the project is anticipated to result in short-term minor adverse impacts to existing infrastructure and utilities, aesthetics and visual resources, and tourism and recreation. However, the project improvements would provide benefits and amenities to park visitors over the long-term.

4.8.4 WQ6, Grand Lagoon Regional Stormwater Facility

The project would result in the construction of a stormwater treatment facility that would occupy an area approximately 20 acres in size and serve a 350-acre basin near Panama City Beach. The proposed location of the facility is in an undeveloped area located between Laird Street and Front Beach Road, less than a half mile south of U.S. Highway 98, approximately three quarters of a mile north of Grand

Lagoon. The facility would include a primary retention pond with a forebay for sediment control and debris removal before the captured stormwater flows into the main pond. In addition, a wide grassed berm around the stormwater facility would be provided as a safe walking path for the public and possible future recreational amenities. This project, combined with the septic to sewer project, would reduce the amount of excess nutrients flowing into the lagoon.

4.8.4.1 Affected Environment

The project area is in an urbanized area near Panama City Beach and drains south to Grand Lagoon, which in turn drains directly to the lower portion of St. Andrew Bay, on the west side of West Pass (to the Gulf), and into St. Andrew Bay, designated as an Aquatic Preserve by the Florida Legislature in 1972. The project area includes construction and operation of a stormwater treatment facility that would serve older portions of the Grand Lagoon area that lack stormwater treatment and still often on septic tanks. The St. Andrew Bay SWIM Plan identifies water quality problems in Grand Lagoon and West Bay and declining water quality in St. Joseph Bay as a watershed priority, along with historic SAV losses. Bay County has identified the upper Grand Lagoon area as one of the highest priority areas in the county in need of stormwater facilities.

Physical Resources

Stormwater runoff from the project area drains via a system of existing open stormwater conveyance channels to Grand Lagoon about a half mile south of the proposed facility. Grand Lagoon is located west of St. Andrew Bay and the St. Andrew Bay Aquatic Preserve. The proposed stormwater facilities are located directly adjacent to existing stormwater channels. The project area is primarily on upland Leon sands (66 percent), although the remaining 34 percent are hydric soils associated with wetlands in the project area.

The St. Andrew Bay Watch (SABW) initiated a community-based water quality monitoring program in 1990, which conducts monthly sampling at 73 fixed stations – 24 in open water, 15 in lakes, 16 in creeks, and 18 within estuarine bayous. Grand Lagoon is one of 11 study areas in the bay. Data from the program are used to analyze trends in water quality over time to characterize the health of St. Andrew Bay, increase understanding of water quality challenges, and promote environmental stewardship. Grand Lagoon was the only water body segment in St. Andrew Bay with a reported decline in water quality by the SABW and the decline (from fair to poor) was attributed to increased stormwater runoff, septic tank drainfield draining to lagoon during rain events, and an increase in seawalls and subsequent decrease in natural shoreline that would reduce nonpoint source pollution into the lagoon (SABW 2014). The Venture Out WWTF is located on the north side of the lagoon. Grand Lagoon is designated impaired for nutrients alone, while most of watershed is impaired for bacteria or bacteria and nutrients.

Water quality impairments in St. Andrew Bay watershed are listed for several stream and estuarine waters and include nutrients, dissolved oxygen, and bacteria. Water quality problems in Grand Lagoon and West Bay, and declining water quality in St. Joseph Bay have resulted in historic seagrass losses and vulnerability. Stormwater runoff is the primary source of nonpoint source pollution in Grand Lagoon and the watershed and it is closely associated with the urban and industrial land use in the project area. Retrofiting existing stormwater management systems is one of the most effective ways to treat

stormwater runoff from urban land use, which have the highest nonpoint source pollution per acre due to impervious surfaces that increase runoff. The primary source of mercury pollution in the environment is atmospheric deposition of mercury, about 70 percent of which comes from anthropogenic sources such as mining, cement production, and other industrial activities.

Biological Resources

Natural habitats make up about 57.7 percent of the project area and are limited to uplands and wetlands in the ROWs associated with the stormwater channels, open areas, and a horse farm (Table 4-26). Upland habitats found in the project area are mesic flatwoods and scrub. Wetlands are predominantly pine flatwoods. There are no estuarine habitats in the project area, although stormwater drains directly to Grand Lagoon. The waters surrounding Grand Lagoon include tidal marshes and extensive SAV beds. SAV in the lagoon include Cuban shoal grass and turtle grass. Fish species include grey snapper, juvenile lane snapper, gag grouper, Gulf flounder, spotted sea trout, and red drum.

The highly urbanized project area is anticipated to include common urban wildlife such as coyotes, fox, rodents, raccoons, opossums, armadillo, squirrels, and a number of birds and reptiles, which can adapt to small but connected forested and green spaces.

Federally listed species that may occur in the project area, as identified through IPaC and FNAI, are listed in Table 4-27 (USFWS 2018a, FNAI 2018). State and federally listed species in the St. Andrew Bay watershed are listed, along with their habitats, in Appendix E. The historical habitat of the Panama City crayfish is believed to have been wet pine flatwoods, but most current populations exist in human-altered settings such as planted pine plantations, roadside ditches, and utility ROWs (FWC 2007). However, the current distribution does not include areas south of West Bay or surrounding Grand Lagoon. Surveys for wood storks, gopher tortoises, and eastern indigo snakes, as well as listed plant species would be performed prior to construction to confirm the presence or absence of these animals. If present, consultation with the USFWS would be initiated to ensure no adverse impacts to these species occur. The area may provide foraging habitat for piping plovers or red knots, but their presence is not anticipated in the project area.

Table 4-26 Acres of habitat in the Grand Lagoon Regional Stormwater Facility project area

FLUCCS Code	Acres	Percent of Total Area
Developed - Total	**10.75**	**42.30**
Agriculture	**4.55**	**17.91**
2510: Horse Farms	4.55	17.91
Urban and Built-Up	**6.20**	24.38
1110: Low Density, Fixed Single Family Units	0.25	1.00
1130: Low Density, Mixed Units (Fixed and Mobile Home Units)	1.20	4.71
1210: Medium Density, Fixed Single Family Units	4.65	18.30
1310: High Density, Fixed Single Family Units	0.09	0.37
Undeveloped - Total	**14.66**	**57.70**
Upland Forests	**6.13**	**24.11**

FLUCCS Code	Acres	Percent of Total Area
4100: Upland Coniferous Forests	6.13	24.11
Wetlands	**8.54**	**33.59**
6250: Hydric Pine Flatwoods	7.43	29.22
6430: Wet Prairies	1.11	4.37
Grand Total	**25.41**	**100.00**
Note: values may not add up due to rounding.		

Table 4-27 Federally listed species potentially occurring in the proposed Grand Lagoon Regional Stormwater Facility project area

Common Name	Scientific Name	Habitat	Status	Likelihood
Florida skullcap	*Scutellaria floridana*	Palustrine: seepage slope, wet flatwoods, grassy openings Terrestrial: mesic flatwoods	T*	Potential
Godfrey's butterwort	*Pinguicula ionantha*	Palustrine: wet flatwoods, wet prairie, bog; in shallow water Riverine: seepage slope; in shallow water. Also, roadside ditches and similar habitat	T	Potential
Harper's beauty	*Harperocallis flava*	Palustrine: seepage slope, wet prairie, roadside ditches	E*	Potential
White birds-in-a-nest	*Macbridea alba*	Palustrine: seepage slope Terrestrial: grassy mesic pine flatwoods, savannahs, roadsides, and similar habitat	T*	Potential
Panama City crayfish	*Procambarus econfinae*	Palustrine: wet flatwoods; temporary or fluctuating ponds or semi permanently inundated ditches, also ruderal, roadside ditches and utility easements	P*	Potential
Eastern indigo snake	*Drymarchon corais couperi*	Terrestrial: mesic flatwoods, upland pine forest, sandhills, scrub, scrubby flatwoods, rockland hammock, ruderal	T	Potential
Gopher Tortoise	*Gopherus polyphemus*	Terrestrial: mesic flatwoods, upland pine forest, sandhills, scrub, scrubby flatwoods, rockland hammock, ruderal	C	Potential
Piping plover	*Charadrius melodus*	Estuarine/Marine: prefer open coastal areas including sandy beaches and tidal flats; areas along the shoreline, including the mudflats. Terrestrial: dunes, sandy beaches, and inlet areas; mostly wintering and migrants	T	Potential
Red knot	*Calidris canutus rufa*	Estuarine: bays, tidal flats, salt marshes Terrestrial: sandy beaches Marine: aerial, near shore	T*	Potential
Wood stork	*Mycteria americana*	Estuarine: marshes Lacustrine: floodplain lakes, marshes (feeding), various Palustrine: marshes, swamps, various	T*	Potential
Note: Species determined to be "Unlikely" to be found in the action area are not addressed further in this analysis. E=Endangered, T=Threatened, SAT=Similarity of Appearance (Threatened), C=Candidate, SSC=Species of Special Concern, CH=Critical Habitat.				

Socioeconomic Resources

The project area is in an urbanized area near Panama City Beach and drains south to Grand Lagoon, which drains directly to the lower portion of St. Andrew Bay, on the west side of West Pass (to the Gulf), and into St. Andrew Bay Aquatic Preserve, designated by the Florida Legislature in 1972. The project area includes an area of approximately 24 acres that would serve the surrounding 350-acre basin. Two 14-acre project sites are located between residential and commercial areas. An outdoor shopping center

and new housing developments are located around the project site. Currently the four parcels where the project site is located are classified as single family residential, commercial and utility. The western most site is listed as being owned by Latson, Maria D & Gray. The eastern most site is listed as being owned by Gray Television Group Inc. and Tote Holdings LLC. Both sites are currently occupied by mostly trees, some grassy areas, and some structures (approximate location between the two sites: 30°10'58.6"N 85°46'37.9"W).

The project area is adjacent to Panama City Beach in the Upper Grand Lagoon area. Upper Grand Lagoon, FL has a population of 15,771 people with a median age of 39.3 and a median household income of $56,508. Between 2015 and 2016 the population of Upper Grand Lagoon, FL grew from 14,216 to 15,771, a 10.9% increase and its median household income grew from $53,391 to $56,508, a 5.84% increase.

4.8.4.2 Environmental Consequences

Only those resource areas for which potential impacts are expected are discussed in detail in for this alternative. The FL TIG analyzed the following resources in more detail below:

- **Physical Resources** – Geology and Substrates, Hydrology and Water Quality
- **Biological Resources** – Habitats, Wildlife Species, Marine and Estuarine Fauna, Protected Species
- **Socioeconomic Resources** – Socioeconomics, Land and Marine Management, Tourism and Recreational Use, Aesthetics and Visual Resources.

Physical Resources

The facility would include a main retention pond with a forebay used for sediment control and debris removal from stormwater runoff. Water would then flow to the main pond. A wide grassed berm with a gently sloping embankment would be would be constructed around the stormwater facility as a safe walking path for the public and possible future recreational amenities.

The project area is highly urbanized and subject to untreated stormwater flow and exfiltration from septic tanks during storms. Stormwater ponds would reduce the high peak flows of stormwater runoff and associated pollutants, including bacteria from septic tanks, from the project area and result in benefits to downstream water quality in Grand Lagoon, which has shown a decline in water quality due to untreated stormwater runoff. This project would directly reduce the discharge pollutant loading that otherwise would impact the health and quality of estuarine habitats in receiving waters of Grand Lagoon. Completion of the project would also help to reduce the potential for beach closures, restrictions on shellfish harvesting, and human health impacts from microbial pathogens.

In summary, since the project area is highly urbanized and developed, the project is unlikely to adversely affect physical resources, and would result in long-term benefits.

Biological Resources

Construction and management of stormwater ponds would result in the permanent loss of any natural upland habitat remaining in the project area. No in-water construction is planned, and construction

would occur in uplands so no impacts to Panama City crayfish, wood storks, or other wetland dependent species are anticipated. Temporary short-term impacts to existing upland habitats are anticipated and consultation and mitigation would be implemented if listed species are onsite to ensure no adverse impacts to these species (as described above). Birds and wildlife would move away during construction either temporarily or permanently and would not be adversely impacted. No adverse impacts to the bird species listed above are expected and the stormwater facility would provide long-term beneficial impacts to several species (e.g., wood stork, other wading birds) by providing forage habitat. Long-term benefits to water quality in Grand Lagoon are also expected to benefit species and habitat in the Grand Lagoon. Improved water quality could improve SAV habitat for fish and other organisms. The addition of the stormwater pond would provide habitat for urban wildlife habitat and support habitat connectivity and serve as a refuge for species impacted by urbanization. The FL TIG would coordinate and complete consultation with relevant regulatory agencies, if necessary, on this project regarding potential impacts to protected species and habitats prior to project implementation.

In summary, the project would result in short- and long-term adverse effects to biological resources, as well as long-term benefits.

Socioeconomic Resources

The project would be expected to result in short-term increase in construction jobs. During the construction phase of this project, construction equipment and operations would likely be located along in previously disturbed areas and parking lots. To the extent required, the use of construction equipment, including equipment used for the movement and placement of materials (i.e., barges) and barriers enacted to protect public safety would result in some minor to moderate short-term adverse impacts on aesthetics and visual quality. These impacts result from the presence of equipment, barriers and construction-related dust and emissions. During the construction period, visible impedances would detract from the natural landscape and create visual contrast for observers. Short-term closures of public areas may be required to accommodate construction activities, which could adversely affect visitors.

The construction of new storm water facilities may affect the visual aesthetic of the neighborhood, due to the construction of new facilities on both properties. The plan would further allow the city to better address local flooding in the 350-acre basin area and to improve water quality treatment within basins that discharge into the Grand Lagoon which would provide economic and recreational benefits to the community.

In summary, the project would result in short- -term minor adverse impacts and long-term benefits to socioeconomic resources.

4.8.5 WQ8, City of Port St. Joe Stormwater Improvements (Preferred)

The project area would retrofit aging and inadequate stormwater infrastructure in the urban portion of the City of Port St. Joe by installing a treatment pond approximately 2.5 acres in size near 16th Street and a downstream outfall weir to provide stormwater treatment and improved water quality protection for St. Joseph Bay. Associated work includes improvement of the conveyance system for enhanced

stormwater management and improved treatment efficiency. The project area is a recreation area and greenway within the urbanized area and includes existing stormwater management infrastructure in need of repair and/or replacement.

4.8.5.1 Affected Environment

The City of Port St. Joe borders St. Joseph Bay in Gulf County and is approximately 100 miles southwest of Tallahassee. The City is within the St. Joseph Bay basin at the farthest east portion of the larger St. Andrew Bay. The Gulf County Canal (GCC) connects the Gulf Intracoastal Waterway to the Gulf of Mexico on the north side of Port St. Joe.

Physical Resources

Soils in the project area are predominantly (approximately 75 percent) upland sands and disturbed due to development. Small areas of depressional soils are associated with stormwater ponds and drainage canals. Hydric soils make up just over 25 percent (82.71 acres) of the project area and include poorly and very poorly drained depressional soils.

No rivers flow into St. Joseph Bay, although the Gulf Coastal Canal and Patton Bayou Canal convey stormwater from the City of Port St. Joe into St. Joseph Bay. Sources of pollution in the St. Joseph Bay watershed, inclusive of Port St. Joe, include marina activities, permitted domestic wastewater and industrial wastewater facilities, and hazardous waste producing facilities, active Storage Tank and Petroleum Contamination sites, and a superfund site in Tyndall AFB. The City of Port St. Joe also operates a permitted wastewater sprayfield. Port St. Joe also has a high density of known and likely septic tanks, which are significant contributors to nonpoint source pollution. Port St. Joe does not have a Municipal Separate Storm Sewer System (MS4) NPDES permit for discharging into waters of the State. Onsite sewage treatment and disposal systems (OSTDS, or septic tanks), which are widespread sources of nutrients that can degrade the quality of groundwater and proximate surface water, occur throughout the City of Port St. Joe and the surrounding area.

Consequently, stormwater runoff and associated nonpoint source pollutions are priorities for the City and Port St. Joe is a geographic focus area for stormwater treatment and management improvements to reduce pollutant loading in the watershed. The City of St. Joe has implemented previous projects intended to reduce the stormwater runoff and associated pollutants into St. Joseph Bay. The St. Joseph Lake Stormwater improvement project (2007) includes a seven-acre wet detention pond that treats nearly 600 acres of land and the Fourth Street Stormwater Pond (2009) is a 1.34-acre wet detention pond that treats 17 acres in the downtown area, and the Sand Hills Pond Stormwater Improvements project (2010) is a wet detention pond to treat 29 acres in the downtown area (2010), both treating runoff that drains to St. Joseph Bay.

Biological Resources

The project area (approximately 320 acres) is primarily developed, with about 240 acres (74.98 percent) in urban and built up land uses (Table 4-28) and is located within and proximate to the city's Forest Park recreation area, with nearly four miles of paved and lighted pedestrian surface, linking a sports park, the Forest Park Par 3 Golf Course, and other small parks and trails. Outside the recreation area, high density

single family and mixed units account for 72.72 acres (22.71 percent) and 94.12 acres (29.40 percent), respectively. Transportation, communications, and utilities make up another 5.56 acres (17.79 percent).

Undeveloped lands account for less than 20 percent (62.33 acres) of the project area and includes mostly rangeland (20.28 acres) and upland forests (14.03 acres). Wetlands and water comprise only 28.02 (8.75 percent) of the project area). Areas identified as undeveloped are limited to the edges of the greenway and baseball fields and provide very limited habitat due to the urbanized nature of the project area. The areas identified as undeveloped are best characterized as urban forest areas and an existing stormwater channel that conveys stormwater runoff from the project area and surround residential and recreation areas to Patton Bayou and then into St. Joseph Bay. The Gulf County Health Department has issued a total of 55 health advisories along the shores of Gulf County, 42 of which were for the St. Joseph Bay Monument Beach adjacent to the Patton Bayou canal.

Wildlife in the project area include common urban species such as typical urban wildlife species include coyotes, fox, rodents, raccoons, opossums, armadillo, squirrels, and a number of birds and reptiles, which can adapt to small but connected forested and green spaces. SAV occurs throughout St. Joseph Bay, including areas just south of Patton Bayou canal. Impaired water clarity due to turbidity, algal blooms and excessive nutrients can adversely impact SAV habitat. Dominant SAV species in the bay include turtle grass (*Thalassia testudinum*), Cuban shoal grass (*Halodule wrightii*) and manatee grass (*Syringodium filiforme*). Water quality is monitored in the bay to evaluate the status and health of the SAV community, which is vulnerable to dredging and filling activities, urban and industrial wastewater discharges, but especially damage from boat propellers. SAV is critical habitat to scallops along the Gulf coast and most of St. Joseph Bay is approved for shellfish harvest and is a popular place for scalloping in the summer season. Shellfish harvest is prohibited in the vicinity of the Gulf Coast Canal and the City of Port St. Joe.

Federally listed species potentially occurring in the project area, as identified through IPaC and FNAI, are listed in Table 4-29 (USFWS 2018a, FNAI 2018). Of these, wood storks, gopher tortoise, and eastern indigo snake may occur in the project area but are unlikely because of the urbanized character of the project area. No estuarine or marine species are expected to occur in the project area.

Table 4-28 Acres of habitat in the City of Port St. Joe Stormwater Improvements project area

FLUCCS Code	Acres	Percent of Total Area
Developed - Total	**257.83**	**80.53**
Transportation, Communication and Utilities	**17.79**	**5.56**
8120: Railroads	6.05	1.89
8140: Roads and Highways	5.21	1.63
8330: Water Supply Plants (Including Pumping Stations)	1.92	0.60
8370: Surface Water Collection Features	4.60	1.44
Urban and Built-Up	**240.04**	**74.98**
1210: Medium Density, Fixed Single Family Units	17.86	5.58
1310: High Density, Fixed Single Family Units	72.72	22.71

FLUCCS Code	Acres	Percent of Total Area
1330: High Density, Multiple Dwelling Units, Low Rise (< 3 stories)	0.92	0.29
1350: High Density, Mixed Units (Fixed and Mobile Home Units)	94.12	29.40
1400: Commercial and Services	22.38	6.99
1700: Institutional (Education, Religious, Health)	8.60	2.69
1850: Parks and Zoos	13.73	4.29
1860: Community Recreational Facilities	9.71	3.03
Undeveloped - Total	**62.33**	**19.47**
Rangeland	**20.28**	**6.33**
3100: Range Land, Herbaceous (Dry Prairie)	20.28	6.33
Upland Forests	**14.03**	**4.38**
4110: Pine Flatwoods	2.48	0.77
4200: Upland Hardwood Forests	4.03	1.26
4340: Hardwood Coniferous - Mixed	7.52	2.35
Wetlands	**21.16**	**6.61**
6170: Mixed Wetland Hardwoods	9.56	2.98
6300: Wetland Forested Mixed	11.60	3.62
Water	**6.86**	**2.14**
5100: Streams and Waterways	6.86	2.14
Grand Total	**320.15**	**100.00**
Note: values may not add up due to rounding.		

Table 4-29 Federally listed species potentially occurring in the City of Port St. Joe Stormwater Improvements project area

Common Name	Scientific Name	Habitat	Status	Likelihood
Eastern Indigo snake	*Drymarchon corais couperi*	Estuarine: tidal swamp Palustrine: hydric hammock, wet flatwoods Terrestrial: mesic flatwoods, upland pine forest, sandhills, scrub, scrubby flatwoods, rockland hammock, ruderal	**T**	**Potential**
Gopher tortoise	*Gopherus polyphemus*	Terrestrial: sandhills, scrub, scrubby flatwoods, xeric hammocks, coastal strand, ruderal	**C**	**Potential**
Piping plover	*Charadrius melodus*	Estuarine/ marine: prefer open coastal areas including sandy beaches and tidal flats; areas along the shoreline, including the mudflats. Terrestrial: dunes, sandy beaches, and inlet areas; mostly wintering and migrants	**T**	**Unlikely**
Red knot	*Calidris canutus rufa*	Estuarine: bays, tidal flats, salt marshes Terrestrial: sandy beaches Marine: aerial, near shore	**T**	**Unlikely**
Wood stork	*Mycteria americana*	Estuarine: marshes Lacustrine: floodplain lakes, marshes (feeding), various Palustrine: marshes, swamps, various	**T**	**Potential**

Common Name	Scientific Name	Habitat	Status	Likelihood
Note: Species determined to be "Unlikely" to be found in the action area are not addressed further in this analysis. E=Endangered, T=Threatened, SAT=Similarity of Appearance (Threatened), C=Candidate, SSC=Species of Special Concern, CH=Critical Habitat.				

Socioeconomic Resources

Port St. Joe is a small, predominately rural community. The Port St. Joe Master Plan describes future plans for the development of a waterfront village that includes large-scale, residential, commercial, and resort development surrounded by green space. This would include a 50 wet-slip and 300 dry-slip marina. Port St. Joe had a 2017 population of 3,574 with a median age of 45.2 years. Approximately 95.3 percent of the population has a high school degree or greater and 9.2 percent of the population lives below the poverty level. Median household income is $40,564. About 60.5 percent of the population is white, followed by 35.5 percent black, and the remaining are mixed race. In comparison, Gulf County had a population of 13,332, made up of 79.9 percent white, 16.9 percent black, and three percent mixed or other individuals.

4.8.5.2 Environmental Consequences

Only those resource areas for which potential impacts are expected are discussed in detail in for this alternative. The FL TIG analyzed the following resources in more detail below:

- **Physical Resources** – Geology and Substrates, Hydrology and Water Quality
- **Biological Resources** – Habitats, Wildlife Species, Marine and Estuarine Fauna, Protected Species
- **Socioeconomic Resources** – Socioeconomics, Land and Marine Management, Tourism and Recreational Use, Aesthetics and Visual Resources.

Physical Resources

The project would retrofit existing stormwater management systems in the City to provide new stormwater treatment facilities, thereby improving water quality in St. Joseph Bay. The stormwater retrofit project, designated Forest Park Stormwater Improvements, is planned for a sub-basin covering approximately 280 acres that drain directly to Patton Bayou and St. Joseph Bay. Receiving waters include sensitive and regionally significant SAV beds that underpin the greater aquatic ecosystem and support important recreational and commercial fisheries.

The project would include construction of approximately 2.5 acres of retrofit treatment pond area near 16th Street with an additional downstream outfall weir added to provide stormwater treatment and improved water quality protection for St. Joseph Bay. Associated work includes improvement of the conveyance system for enhanced stormwater management and improved treatment efficiency. In addition, the project would fund development of a stormwater master plan, which the City currently lacks. Completion of this plan would allow the City to evaluate its current stormwater systems through data collection, mapping, watershed delineation, preparation of a stormwater features inventory, development of proposed improvements, and prioritization of watersheds. The plan would further allow

the City to better address local flooding and to improve water quality treatment within basins that discharge into St. Joseph Bay.

St. Joseph Bay is a waterbody of state and regional significance. It is a designated state aquatic preserve, OFW, and Surface Water Improvement and Management priority. The bay provides important resources for shellfish and other fisheries and public recreation. The impaired waters list established by the Florida Department of Environmental Protection identified St. Joseph Bay as impaired for nutrients (TN) and bacteria. SAV beds are within and proximate to the area influenced by stormwater runoff from the City, specifically including the basin designated for treatment through this project.

Coordination with the NWFWMD, FDEP, and the USACE would be conducted, as needed, for ERP and Section 404 permits for the project. During construction, BMPs and required stormwater and erosion control measures would be implemented to avoid adverse impacts to drainage basins, floodplains, surface waters, or ground water resources. An NPDES stormwater construction permit would be obtained prior to construction activities and permit requirements would be implemented accordingly. Wetland mitigation needs would be assessed during the Florida Environmental Resource Permit, USACE Section 404 Permit, and the Application for Works in the Waters of Florida processes. Roadway improvement activities would meet federal and state regulations for increased stormwater management, creating long-term benefits to water resources. Construction and stormwater permits would include an Erosion, Sedimentation, and Pollution Control Plan which would require the implementation of site-specific management actions and BMPs, such as planting vegetation, and employing silt fencing, sand bags, rock bags, sediment traps, sediment basins, synthetic bales, and floating and staked turbidity barriers. These measures would help ensure that road and bridge construction activities do not create erosion, sedimentation, or siltation, which could negatively impact individual species and their habitat.

In summary, the project is anticipated to result in short-term minor adverse impacts and long-term benefits to physical resources.

Biological Resources

Biological resources in the project area are limited due to the urban nature of the project area. Common wildlife and bird species may be disturbed by construction activities and move temporarily or permanently to other areas, although these species are present in an urban area and may be habituated to the noise and activities. Common wildlife such as armadillos, opossums, raccoons, and rabbits, some wading birds such as egrets and herons, reptiles such as box turtles and rat snakes, and transient migratory bird species may be temporarily impacted during the project construction due to noise and temporary loss of habitat as stormwater channels are modified. These animals would return to the site after construction was completed or may permanently relocate to adjacent natural areas in Franklin and Gulf counties. Stormwater improvements would reduce flooding along the project area; however, the area is mowed and used for recreation, so that adverse impacts to habitat are not anticipated as a result of the project. No long-term or permanent adverse impacts to the limited biological resources in the project area are anticipated. The FL TIG has begun coordinating with the relevant regulatory agencies related to potential impacts to protected species and habitats.

The existing greenspace would not be removed and would continue to provide habitat for urban wildlife. The addition of the stormwater pond would provide habitat for urban wildlife habitat and support habitat connectivity and serve as a refuge for species impacted by urbanization.

In summary, the project is anticipated to result in short-term minor adverse impacts to biological resources during construction and long-term benefits to biological resources.

Socioeconomic Resources

The project would be expected to result in short-term increase in construction jobs. During the construction phase of this project, construction equipment and operations would likely be located along in previously disturbed areas and parking lots. To the extent required, the use of construction equipment, including equipment used for the movement and placement of materials (i.e., barges) and barriers enacted to protect public safety would result in some minor to moderate short-term adverse impacts on aesthetics and visual quality. These impacts result from the presence of equipment, barriers and construction-related dust and emissions. During the construction period, visible impedances would detract from the natural landscape and create visual contrast for observers. Short-term closures of public areas may be required to accommodate construction activities, which could adversely affect visitors.

The construction of 2.5 acres of retrofit treatment pond area near 16th Street would likely change the aesthetic of the greenway and surrounding area. The plan would allow the city to better address local flooding and to improve water quality treatment within basins that discharge into St. Joseph Bay. The project would provide economic benefit by improving the quality of important resource for shellfish and other fisheries and public recreational fishing.

In summary, the project is anticipated to result in short-term adverse impacts and short-term benefits to socioeconomic resources.

4.9 Apalachicola River and Bay Watershed

Figure 4-18 Restoration Alternatives located in Apalachicola River and Bay Watershed

As shown in Figure 4-18, four projects are located in Apalachicola River and Bay watershed:

- T.H. Stone Memorial St. Joseph Peninsula State Park Improvements (REC10);
- Apalachicola Bay Watershed - Nutrient Reduction (NR2);
- MK Ranch Hydrologic Restoration (WQ9); and
- City of Carrabelle's Lighthouse Estates: Septic Tank Abatement - Phase II (WQ10).

The Apalachicola River and Bay SWIM Plan, updated in 2017 (NWFWMD 2017e), focuses on water quality and associated resources and benefits, as well as public access and recreation, fish and wildlife resources, floodplain management, and economic development and sustainability in the watershed. The watershed level information presented here is summarized from the SWIM Plan and provides existing environmental conditions and context for projects in the watershed.

4.9.1 Area Overview

The Apalachicola River is the largest river in Florida with respect to volume of flow and has the largest forested floodplain of all of Florida's rivers. The river headwaters are at Lake Seminole, an impounded lake at the confluence of the Chattahoochee and Flint rivers and along the Georgia-Florida border. In addition to being the primary freshwater source to the Apalachicola Bay in the Gulf of Mexico, the river and its contributing basin are the primary source of irrigation water for agricultural operations in southwest Georgia. As described in the SWIM Plan (NWFWMD2017), Florida, Georgia, Alabama, and the USACE have been involved in periods of litigation regarding the use and management of water since 1990. In 2013, the State of Florida filed an original action with the U.S. Supreme Court seeking an equitable apportionment of the basin's waters and a cap on Georgia's water consumption. Florida continues to pursue equitable interstate allocation of water resources in the watershed and management of the watershed and its resources continue to focus on the long-term sustainability, health, and productivity of these resources.

The Florida portion of the Apalachicola River and Bay watershed makes up approximately 2,850 square miles (14 percent) of the larger 20,149 square mile watershed that encompasses approximately 20,149 square miles of Florida, Alabama, and Georgia. The floodplain in Florida is approximately 71 miles long, with widths from one to five miles, and coverage of approximately 112,000 acres. In Florida, the watershed falls primarily within six counties: Calhoun, Franklin, Gadsden, Gulf, Jackson, and Liberty. Minor portions of the watershed are within Bay and Washington counties. The cities of Apalachicola and Carrabelle border Apalachicola Bay, and Bristol, Blountstown, and Chattahoochee border the Apalachicola River, as well as many small municipalities. Public and conservation lands encompass approximately 611,888 acres of the watershed within Florida (approximately 33 percent of the watershed in Florida).

In addition to the Apalachicola River and Apalachicola Bay, the watershed includes the Chipola, New and Carrabelle rivers, Lake Wimico, Alligator Harbor, and other tributaries. The watershed also includes the first magnitude Jackson Blue Spring and ten second magnitude springs within the Chipola River basin. The New River is a tributary of Apalachicola Bay that begins in Liberty County. The New River basin occupies 516 square miles in Liberty and Franklin counties before draining into St. George Sound through the Carrabelle River. The Carrabelle River is formed at the confluence of the New and Crooked rivers. The Crooked River forms the boundary of St. James Island and joins the Apalachicola Bay drainage basin with that of Ochlockonee Bay watershed to the east.

4.9.1.1 Physical Resources

The Apalachicola River is entirely within the lower Coastal Plain physiographic province and is the only Florida river system originating in the Piedmont and southern Appalachian Mountains. The river flows south from the Northern Highlands and Tallahassee Hills, dropping over the Cody Scarp into the Coastal Lowlands of southern Franklin and Gulf county, and then flowing into the Gulf of Mexico. The Apalachicola River is the dominant source of freshwater inflow to Apalachicola Bay, with an average annual discharge of 22,648 cubic feet per second (cfs) at the gage in Sumatra (1978-2016). The Chipola, Brothers, and Jackson rivers and Flat, Big Gully, Black, Owl, and Whiskey George creeks, are all tributaries to the Apalachicola River within Florida. Lake Wimico is a large lake that drains to the

Apalachicola River through the Jackson River in the lower watershed. Approximately 1,139,655 acres (about 63 percent of the Florida watershed) are delineated as Special Flood Hazard Areas, which means they are at high risk for flooding. These are primarily forested wetlands, composed of bottomland hardwood and cypress/tupelo swamps, with the habitat grading to a tidal marsh at the river delta.

Water quality priorities identified for watershed were identified in the SWIM Plan (NWFWMD 2017e) and include addressing water quality impairments in stream and estuarine waters (e.g., nutrients, DO, and bacteria), eutrophication in Jackson Blue Spring, and vulnerability of oyster beds, seagrasses, and springs. Priorities also include reducing nonpoint source pollution, including stormwater runoff; sedimentation and turbidity from unpaved roads, spoil sites, and other erosion sources; and inadequate wastewater treatment and management.

4.9.1.2 Biological Resources

The Apalachicola River and Bay watershed encompasses a diversity of natural habitats, including upland, coastal, transitional, wetland, aquatic, estuarine, and marine communities. The watershed includes 35 distinct natural communities within 15 broader community categories as characterized by FNAI (FNAI 2010). Priorities identified in the SWIM Plan (NWFWMD 2017e) include habitat and hydrologic restoration of altered wetland and stream habitats, oyster reefs, and agricultural and silvicultural operations, and other areas where nonpoint source pollution and erosion have altered natural habitats.

Upland forests make up approximately 47.2 percent of the Florida portion of the watershed, followed by 32.7 percent wetlands and 12.8 percent agricultures. Only 5.2 percent of the watershed is considered developed. Water (1.8 percent) and open land (0.8 percent) account for the remainder of the watershed. Upland communities in the watershed include sandhill, scrub, pine flatwoods, mixed hardwood forests, scrubby flatwoods, mesic flatwoods, wet flatwoods, xeric hammocks, coastal grassland, coastal interdunal swale, and beach dune communities (detailed in NWFWMD 2017e).

Wetland communities in the watershed include cypress swamps, dwarf cypress swamps, tupelo-cypress swamps, Atlantic white cedar swamps, wet prairie, wet pine flatwoods, and mixed forested wetlands. Tidal marsh is abundant in the coastal extent of the watershed. The quantity and timing of freshwater inflow from the Apalachicola River defines the habitats within the estuary, maintaining the natural salinity regime and balance of nutrients that support oyster beds and estuarine nursery areas, as well as the overall productivity of the bay. Nutrients from the Apalachicola River system also enhance offshore productivity within the Gulf of Mexico. Major estuarine habitats include oyster bars, tidal flats, soft sediment, tidal marshes, open water habitats, and SAV beds Estuarine waters within the Apalachicola River and Bay watershed support numerous species of fish and invertebrates. Many these species use lower salinity regions of Apalachicola Bay and East Bay as critical nursery grounds. Approximately 184 taxa of fish have been identified by the Florida Fish and Wildlife Research Institute throughout Apalachicola Bay and the lower river.

Listed species supported by upland communities include the gopher tortoise, eastern indigo snake, and the red-cockaded woodpecker. Trees such as the Florida torreya (*Torreya taxifolia*) and the Florida yew (*Taxus floridana*) are endemic to the bluffs and ravines along the east side of the Apalachicola River that

are also characterized by mixed hardwood and pine slope forests and support concentrations of rare, endangered, and endemic plant and animal species. Listed animal species found in wetlands and aquatic habitats in the watershed include the many federally listed species, including the reticulated and frosted flatwoods salamanders and six species of federally listed freshwater mussels. Critical habitat for these species is also designated in the watershed. The Apalachicola River and Bay are designated critical habitat for the federally listed Gulf sturgeon. A complete list of federally and state listed species and designated federal habitat in the watershed is provided in Appendix E, with corresponding habitats.

4.9.1.3 Socioeconomic Resources

Based on spatial analysis of U.S. Census data, it is estimated that the population of the Apalachicola River and Bay watershed was 88,413 in 2010.. In the Florida watershed, the largest concentration of population is within Jackson County. Throughout the basin, population density is low, with fluctuations along the coast corresponding with seasonal visitors. Counties in this watershed include Gulf County, Franklin County, and portions of Liberty County, Jackson County, and Calhoun County.

Gulf County has a population of 16,160. Gulf County is demographically slightly worse off than Florida and the U.S. as a whole, as shown in Appendix D. The percent of white individuals in Gulf County (78.8 percent) is similar to the State of Florida and the U.S., both approximately 77 percent (U.S. Census Bureau 2018). The percent of the population (aged 25 or older) with a high school education is 82.5 percent slightly lower than the State of Florida and for the U.S. (both 87 percent). The percent of the population (aged 16 or older) in the labor force in Gulf County (45.0 percent) is lower than the State and U.S. levels (58.5 percent and 63.1 percent respectively) (U.S. Census Bureau 2018). Median household income ($40,822) is lower than both the U.S. ($55,322) and Florida ($48,900). The percent of the population living in poverty is significantly higher in Gulf County (23.5 percent) than is typical in Florida and in the U.S. (14.7 percent and 12.7 percent respectively; U.S. Census Bureau 2018).

Franklin County has a population of 11,727. Franklin is demographically worse off than Florida and the U.S. as a whole, as shown in Appendix D. The percent of white individuals in Franklin County (82.9 percent) is slightly higher than for the State of Florida and the U.S., both approximately 77 percent (U.S. Census Bureau 2018). The percent of the population (aged 25 or older) with a high school education is 79.6 percent lower than for the State and of Florida and for the U.S. (both 87 percent). The percent of the population (aged 16 or older) in the labor force in Franklin County (47.7 percent) is lower than the State and National levels (58.5 percent and 63.1 percent respectively) (U.S. Census Bureau 2018). Median household income ($40,301) is significantly lower than the U.S. ($55,322) and slightly lower than Florida ($48,900). The percent of the population living in poverty is higher in Franklin County (23.1 percent) than is typical in Florida or the U.S. as whole (14.7 percent and 12.7 percent respectively; U.S. Census Bureau 2018).

4.9.2 REC10, T.H. Stone Memorial St. Joseph Peninsula State Park Improvements (Preferred)

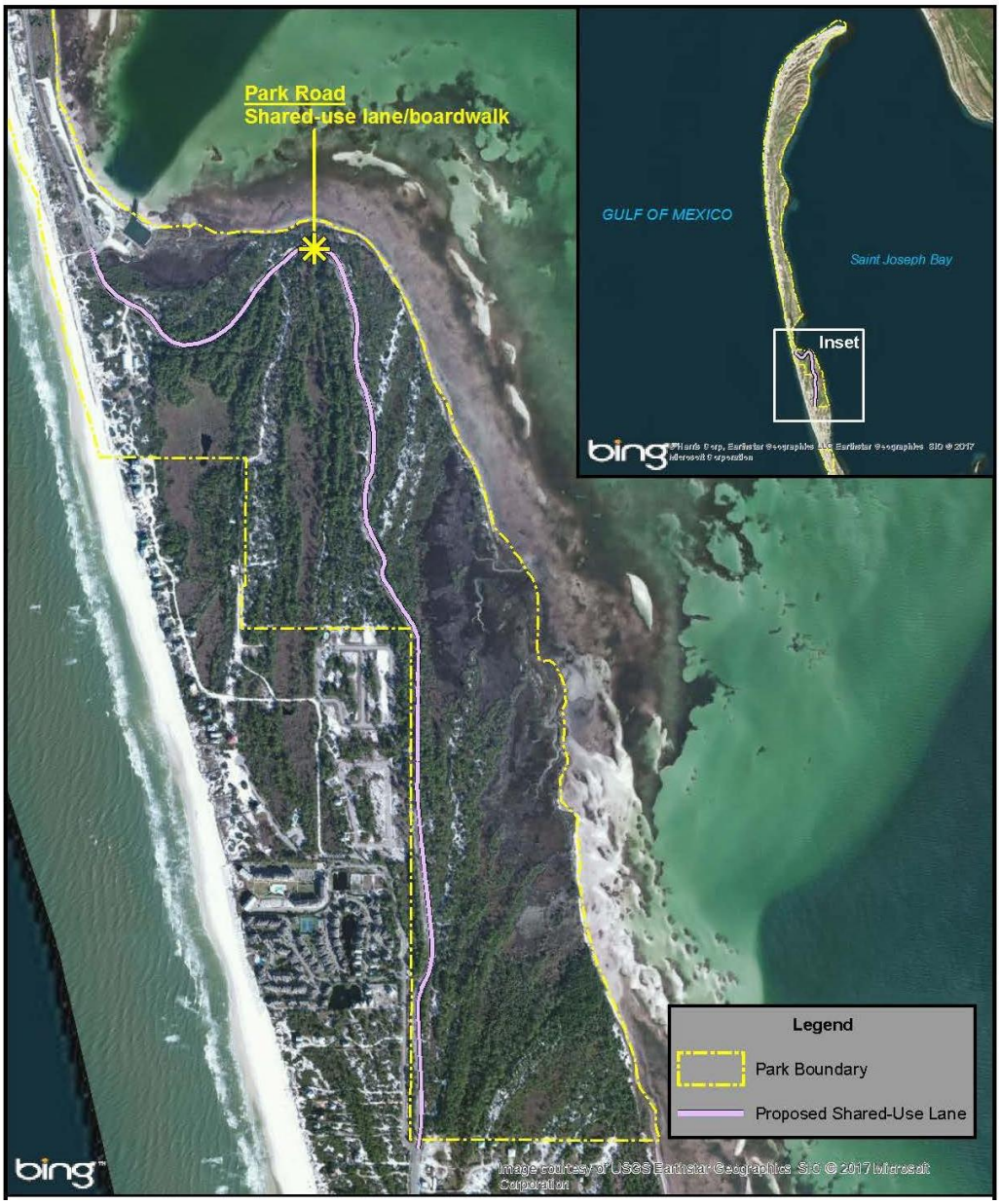
T.H. Stone Memorial St. Joseph Peninsula State Park is a 2,716-acre park on St. Joseph Peninsula in Gulf County (Figure 4-19). The proposed improvement would take place on an approximately 400-acre

portion of the park on the peninsula, bordered by the Gulf of Mexico to the west and St. Joseph Bay to the east. Specifically, the project would include:

- Construction of an approximately 9,800 feet long and 8-foot-wide shared-use path for safe and scenic bicycle and pedestrian access, from the park entrance to the Eagle Harbor Day Use Area and primary Gulf Beach Access. Approximately 8,600 feet would be asphalt and 1,200 feet would be boardwalk to minimize dune and wetland impacts.

This addition would enhance the public's access to the surrounding natural resources and enhance recreational experiences. The action area for the project does not include the Gulf coast portion of the park or marine habitat areas. Additional details on the project are provided in Chapter 2 (Section 2.5.4).

Figure 4-19 T.H. Stone Memorial St. Joseph Peninsula State Park Proposed Improvements



4.9.3.1 Affected Environment

Physical Resources

St. Joseph Peninsula State Park is located on the Gulf Coastal Lowlands, which is characterized by flat and sandy terrain. Erosion on the St. Joseph Peninsula is moving sand to its northern tip causing northward accretion at a rate of approximately 40 feet per year. The soils in St. Joseph Peninsula State Park are predominantly Corolla-Duckston complex, which is composed of sand (USDA NRCS 2018). The proposed shared use trail would be constructed predominantly on this Corolla-Duckston complex soils, with some Duckston-Duckston and Kureb-Corolla. The peninsula is bordered by St. Joseph Bay to the East and the Gulf of Mexico to the west. The waters surrounding the peninsula are designated an Aquatic Preserve and OFW and waters within the Park are also designated as an OFW. The proposed shared-use trail is located in FEMA flood Zone VE (flood elevation 8-12 feet) and Zone AE (flood elevation 8-9 feet; FEMA 2018).

Biological Resources

Upland habitats present at St. Joseph Peninsula State Park include beach dunes, scrub, flatwoods, grasslands, and marshes (FDEP 2014b). Beach dunes and scrub communities are the habitat communities in the park that cover the most area. Vegetation on beach dunes includes sea oats, seashore elder, gulf coast bluestem, sandbur, and panic grass. The scrub communities are dominated by evergreen shrubs. There are two distinct scrub communities, oak scrub and sand pine scrub. The Park contains several basin marshes, coastal interdunal swales, and ephemeral tidal pools. There are various estuarine and marine wetlands, freshwater emergent wetlands, freshwater forested/shrub wetlands, and ponds in the action area according to the most recent National Wetlands Inventory (USFWS 2018b). St. Joseph State Park has minimum development. There are sixteen existing structures within the Park, which were all constructed for visitor and staff use, including the entrance station, concession building, bathhouse, campers' restroom, camp shelter, two camp sub-centers, four shop/storage buildings, and five picnic shelters (FDEP 2014b).

SAV beds are found in the waters surrounding the park. Approximately one-sixth, or 9,669 acres, of St. Joseph Bay is covered in SAV (FDEP 2018, NOAA OR&R, UNH, and USEPA 2018). EFH for coastal migratory pelagics, stone crabs, reef fish, and shrimp is present in the Gulf of Mexico to the west of the park outside of the action area for the project; and EFH for coastal migratory pelagics, stone crabs, reef fish, red drum, and shrimp is present within St. Joseph Bay (NOAA OR&R, UNH, and USEPA 2018).

Fish and wildlife potentially present in and around the site include migratory birds and select aquatic and terrestrial protected species. Migratory birds could potentially use this site for nesting, foraging, roosting, and breeding. Potential migratory bird groups include wading birds (e.g., rails), shorebirds (e.g., terns, plovers, and skimmers), raptors (e.g., kestrels, bald eagles, kites), and songbirds (e.g., sparrows, warblers, woodpeckers). There is potential for bald eagles to be present at this site (USFWS 2018a). Although these species could occur on the parcel, they are not known to inhabit or nest in the action area or in the nearby vicinity.

The list of federally threatened, endangered, proposed, candidate, and other species of concern for this site, as identified through USFWS IPaC, is presented in Table 4-30 (USFWS 2018a). There is terrestrial

critical habitat at the site for Loggerhead sea turtle (LOGG-T-FL-40) and St. Andrew beach mouse (Unit 3; NOAA OR&R, UNH, and USEPA 2018). There is marine critical habitat for Gulf sturgeon (Unit 11) and Loggerhead sea turtle (Logg-N-31) on the Gulf of Mexico side (NOAA OR&R, UNH, and USEPA 2018); there is no in-water work, so aquatic critical habitats are outside of the project action area. A list of all state and federally listed species found in this watershed is presented in Appendix E.

Table 4-30 Federally listed species potentially occurring in the T.H. Stone Memorial St. Joseph Peninsula State Park Recreation project area

Common Name	Scientific Name	Habitat	Status	Likelihood
Chapman rhododendron	*Rhododendron chapmanii*	Palustrine: seepage slope (titi bog); terrestrial: mesic flatwoods; ecotone between flatwoods and more xeric longleaf communities and bogs.	E	Unlikely
Florida skullcap	*Scutellaria floridana*	Palustrine: seepage slope, wet flatwoods, grassy openings Terrestrial: mesic flatwoods	T	Unlikely
Godfrey's butterwort	*Pinguicula ionantha*	Occurs primarily in wet prairies, savannahs, and pine flatwoods.	T	Unlikely
Harper's beauty	*Harperocallis flava*	Palustrine: seepage slope, wet prairie, roadside ditches	E	Unlikely
Telephus spurge	*Euphorbia telephioides*	Terrestrial: mesic flatwoods; disturbed wiregrass, coastal scrub	T	Unlikely
White birds-in-a-nest	*Macbridea alba*	Terrestrial: mesic flatwoods; disturbed wiregrass, coastal scrub	T	Unlikely
Gulf sturgeon	*Acipenser oxyrinchus desotoi*	The Gulf sturgeon inhabits coastal waters and freshwater river systems of the northern Gulf of Mexico. Gulf sturgeon are usually located in areas 2-4 meters deep with high sand substrate.	T	Unlikely
Reticulated flatwoods salamander	*Ambystoma bishopi*	This salamander inhabits pond areas in pine flatwoods and pine savannas.	E	Unlikely
Green sea turtle	*Chelonia mydas*	Stays near the coastline and in bays near SAV habitats. They breed adjacent to the shoreline, and nest on sandy beaches.	T	Potentially
Hawksbill sea turtle	*Eretmochelys imbricata*	Forages around coral reefs; spends time in bays and estuaries. They breed adjacent to the shoreline, and nest on sandy beaches.	E	Potentially
Kemp's Ridley sea turtle	*Lepidochelys kempii*	Forage in sargassum and open waters. They breed adjacent to the shoreline, and nest on sandy beaches.	E	Potentially
Leatherback sea turtle	*Dermochelys coriacea*	Forages in the open ocean waters. They breed in deep waters adjacent to the shoreline, and nest on sandy beaches.	E	Potentially
Loggerhead sea turtle	*Caretta caretta*	Forages in the open ocean and shallow coastal waters. They breed adjacent to the shoreline, and nest on sandy beaches.	T	Likely
Piping plover	*Charadrius melodus*	Prefer open coastal areas including sandy beaches and tidal flats; areas along the shoreline, including the mudflats.	T	Unlikely
Red knot	*Calidris canutus rufa*	These birds prefer open coastal areas including sandy beaches and tidal flats. They	T	Unlikely

Common Name	Scientific Name	Habitat	Status	Likelihood
		prefer areas along the shoreline, including the mudflats.		
St. Andrew beach mouse	*Peromyscus polionotus peninsularis*	This mouse lives in sand dunes that have a moderate cover of grasses and forbs.	E	Likely
Note: Species determined to be "Unlikely" to be found in the action area are not addressed further in this analysis. E=Endangered, T=Threatened, SAT=Similarity of Appearance (Threatened), C=Candidate, SSC=Species of Special Concern, CH=Critical Habitat.				

Socioeconomic Resources

T.H. Stone Memorial St. Joseph Peninsula State Park is a coastal state park managed by FDEP Division of Recreation and Parks. Tourists pay an entrance fee to use the park amenities including restrooms, trails, and access to fishing, boating, camping, scuba diving, and swimming. A concession stand offers food and supplies as well as rental equipment. Recreational angling is significant in the Florida panhandle and is primarily conducted from boats, shorelines, and piers at and near the site. The action area is located on state lands within the park boundaries (FDEP 2014b).

St. Joseph State Park has minimal development. There are sixteen existing structures within the Park, which were all constructed for visitor and staff use, including the entrance station, concession building, bathhouse, campers' restroom, camp shelter, two camp sub-centers, four shop/storage buildings, and five picnic shelters. There are no designated protected view sheds in the vicinity of this project.

4.9.3.2 Environmental Consequences

Only those resource areas for which potential impacts are expected are discussed in detail in for this alternative. The FL TIG analyzed the following resources in more detail below:

- **Physical Resources** – Geology and Substrates, Hydrology and Water Quality
- **Biological Resources** – Habitats, Wildlife Species, Marine and Estuarine Fauna, Protected Species
- **Socioeconomic Resources** – Socioeconomics, Land and Marine Management, Tourism and Recreational Use, Aesthetics and Visual Resources.

Physical Resources

This project includes building a shared use path within the Park that would connect to an existing path along Gulf County Road 30E/Cape San Blas Road that currently terminates outside of the Park. There is an existing road that the proposed shared use path would roughly follow. Implementation of this project could include use of heavy construction equipment, such as bulldozers, trucks, backhoes, tractor trailers, small excavators, fork lifts, asphalt machine, roller, small power tools, generators, small trucks, and hand tools.

This project does not include in-water work; the improvement takes place on upland areas. As such, there would be no disturbance of soils or sediments in waters adjacent to the site. Digging would occur in the terrestrial environment, over approximately 72,000 square feet and would roughly follow the

existing footprint of the road, but would deviate in wetland or dune habitat areas. Digging or soil removal for installation of pilings for the boardwalk sections would remove or compact an area approximately 200 square feet (final depth TBD based on final design). Construction and digging activities, including staging areas for construction equipment, would utilize existing development footprints and disturbed areas where possible (e.g., current road footprint), but digging and staging equipment would disturb some soils. The path would use existing trails and disturbed areas, where possible, to minimize impacts. Although development of the shared-use path would impact soils, it would direct and condense car/bike/foot traffic into designated areas, minimizing adverse impacts to the overall site location. Terrestrial work that may affect hydrology and water quality includes construction of additional impervious surfaces from the asphalt sections of the road. Additional impervious surfaces would alter onsite stormwater runoff. Construction of the shared-use path temporarily impact water quality from increased runoff.

Specific mitigation measures would be implemented during construction to minimize erosion and overall soil impacts. Construction involving ground disturbances from the proposed shared-use path would have short-term minor and long-term adverse impacts on geology and substrates. This project would result in short-term minor as well as long-term adverse impacts on water quality due to the potential construction of some impervious surfaces and site preparation activities.

In summary, the project would have short-term and long-term adverse minor impacts to physical resources.

Biological Resources

Construction activities in water and on land associated with this project could result in short-term impacts to aquatic habitat due to erosion and increased turbidity from runoff during construction. The release of soils during terrestrial construction would be controlled using BMPs and mitigation to protect aquatic habitat, prevent the transport of sediment into waterways, confine impacts to construction sites, and minimize the magnitude of the impacts on water quality in St. Joseph Bay and the Gulf of Mexico.

The terrestrial improvement would avoid wetlands and dune habitat, to the extent practical and feasible, and would elevate boardwalk sections in these habitats if they cannot be avoided. Construction in wetland habitat is subject to regulatory consultations depending on the final design. Any work in wetland habitat would be coordinated with the USACE pursuant to the Section 404 of the CWA/RHA. Coordination with the USACE and final authorization pursuant to CWA/RHA would be completed prior to final design and construction. There is no in-water work, so while there may be increased runoff from construction activities and impervious surface increases, there are no effects anticipated to SAV or EFH. Specific conservation and mitigation measures would be implemented during the finalization of engineering and design plans and construction to minimize erosion and overall habitat impacts.

Construction equipment and staging areas could impact habitat, but as noted previously, these would be sited on existing development footprints where possible to minimize impacts. Although the shared-use path could potentially impact habitats and biological resources (e.g., clearing of vegetation or adding

pilings in habitat), the path is proposed for the currently disturbed area of the existing road. Additionally, the path would direct and condense foot/bike/vehicle traffic into designated areas, minimizing adverse impacts to the habitats and species over the long-term. To mitigate potential impacts to the dune habitat from the construction of the shared use trails, the Conservation Measures for Dune Walkover Construction (USFWS 2017) would be implemented during final design and construction.

The FL TIG would coordinate with the USFWS and review this project for impacts to bald eagles and migratory birds in accordance with the Bald and Golden Eagle Protection Act (BGEPA) of 1940 (16 U.S.C. §§ 668–668d) and the Migratory Bird Treaty Act of 1918 (MBTA) (16 U.S.C. §§ 703–712) to ensure that appropriate conservation measures and BMPs would be incorporated into the project.

To the extent possible, construction activities would avoid specific habitat locations onsite if there are known nesting birds and avoid nesting seasons. At a minimum, trees/shrubs with active nests would be flagged and avoided. To avoid or minimize impacts to migratory birds from increased human activity, tree removal would be minimized, and the path would divert and concentrate recreational users away from any important nesting, foraging, or rookery locations. Additionally, signage could be installed along the path to provide users information on sensitive species in the area and actions to take to avoid or minimize impacts to sensitive species. Foraging and resting birds may temporarily be displaced during construction or recreation activities. Bird roosting would not be affected because construction activities and most human use would occur during daylight hours.

The FL TIG has begun coordinating with the relevant regulatory agencies related to potential impacts to protected species and habitats. Conservation measures recommended during formal consultation would be incorporated into final project design and implementation to avoid and/or minimize impacts to protected species and critical habitats. Specific conservation measures would also be implemented during construction to avoid and minimize disruption and overall impacts to protected species. Below is a list of potential protected species onsite, effects from the project activities, and potential conservation measures.

St. Andrew beach mouse and critical habitat: Critical habitat (Unit 3) is found in the dunes of St. Joseph Peninsula. If the boardwalk or path are constructed through or adjacent to critical habitat, construction activities would likely cause adverse impacts to the St. Andrew beach mouse habitat. Impacts could result from construction activities and increased visitation from noise, erosion, and damaged dunes and vegetation. Due to past and ongoing disturbances and human traffic in the vicinity of the action area (i.e., existing road), it is not likely that the St. Andrew beach mouse would be present in the action area. This species is highly mobile and is likely to leave the area during construction. However, if any of these mice are encountered onsite, construction would be halted and USFWS would be contacted. The proposed path would avoid direct and indirect impacts to beach mice and critical habitat, where feasible. Native vegetation plantings will be conducted in two areas along the trail adjacent to beach mouse habitat, with spot treatment of invasive plant species to help provide shelter for beach mice crossing the path. This project may have short-term adverse effects on the St. Andrew beach mouse, but it is not likely to have long-term adverse effects on this species or critical habitat.

Sea turtles and critical habitat: The project location intersects with critical habitat for the loggerhead sea turtle for in-water, nearshore reproductive habitat (unit LOGG-N-31) and on land (unit LOGG-T-FL-40). The shared path would be located in upland habitats with portions that cross dune habitat and could be adjacent to nesting habitat but are not proposed within nesting habitat or on beaches. However, it is unlikely that turtles would travel that far inland to nest, so the actual nesting habitat would not be disturbed. There is no in-water work, so no nearshore reproductive habitat would be impacted. This project may have adverse effects on sea turtle nesting during construction due to noise, disturbance of sand, or increased lighting. However, construction activities would be restricted to daylight hours. If there are lights proposed to be added to the site along the path, there could be concerns for nesting sea turtles; if lights are needed or proposed, they would be sea turtle friendly lights. However, there are no lights proposed and construction would take place during the day, so while there may be adverse effects on nesting sea turtles from increased lighting, these effects would be mitigated by sea turtle friendly lighting if lights are necessary and restricting construction to daylight hours. There would be no effects on in water sea turtles, but this project may have indirect short-term adverse effects on nesting sea turtles during construction due to noise and disturbance of sand, but there would be no long-term adverse effects on sea turtles or critical habitat.

Short-term as well as long-term adverse impacts to biological resources would occur onsite as a result of construction and site preparation activities. Long-term impacts associated with habitat and wildlife disturbance from visitors on the site are anticipated to be minor.

In summary, because the construction activities would be localized to the site, would largely be in previously disturbed areas, and habitat fragmentation would be limited to the sections of elevated boardwalk, impacts from this project to biological resources would be minor, adverse, short- and long-term.

Socioeconomic Resources

The project would be expected to result in short-term increase in construction jobs. During the construction phase of this project, construction equipment and operations would likely be located along in previously disturbed areas and parking lots. To the extent required, the use of construction equipment, including equipment used for the movement and placement of materials (i.e., barges) and barriers enacted to protect public safety would result in some minor to moderate short-term adverse impacts on aesthetics and visual quality. These impacts result from the presence of equipment, barriers and construction-related dust and emissions. During the construction period, visible impedances would detract from the natural landscape and create visual contrast for observers visiting the project areas. Short-term closures of public areas may be required to accommodate construction activities, which could adversely affect visitors.

Over the long-term, the infrastructure improvements included in this project would impact the appearance of the land from the water, creating a more developed appearance, and provide more recreational opportunities. Planned improvements should enhance visitor experiences at the park.

In summary, the project is anticipated to result in short-term minor adverse impacts to existing infrastructure and utilities, aesthetics and visual resources, and tourism and recreation. However, the project improvements would provide benefits and amenities to park visitors over the long-term.

4.9.3 NR2, Apalachicola Bay Watershed – Nutrient Reduction

The goals of the project are to 1) improve water quality by reducing nutrient loads to coastal watersheds 2) develop conservation plans on agricultural land to address nutrient and sediment runoff; and 3) implement conservation practices identified in the conservation plans. The goals of the project are to 1) improve water quality by reducing nutrient loads to coastal watersheds 2) develop conservation plans on agricultural land to address nutrient and sediment runoff; and 3) implement conservation practices identified in the conservation plans. The project would be implemented by USDA in the upper Choctawhatchee and Apalachicola Bay watersheds in three HUC12 watersheds: Upper Dry Creek-Chipola River and Lower Dry Creek-Chipola River in the Apalachicola Bay watershed, and Alligator Creek-Holmes Creek in the Choctawhatchee River watershed.

USDA and its conservation partners would help voluntarily participating landowners by developing conservation plans that identify natural resource concerns and conservation practices landowners can implement to reduce nutrient and sediment runoff. Section 4.6.5, NR1 Pensacola and Perdido Key Watersheds Water Quality-Nutrient Reduction provides a more detailed description of the actions that would be conducted as part of this action. Additional details on the project are provided in Chapter 2 (Section 2.5.2).

4.9.3.1 Resources Analyzed in Detail for this Alternative

Table 4-19 identifies how resources are assessed for the Nutrient Reduction Alternatives. Only those resource areas for which potential, adverse impacts are expected are discussed in detail in this draft RP/EA. The FL TIG analyzed the following resources in more detail below:

- **Physical Resources:** Hydrology and Water Quality
- **Biological Resources:** Habitats, Wildlife Species, Protected Species, Marine and Estuarine Fauna

4.9.3.2 Affected Environment

Physical Resources

Please refer to section 4.9.1.1, Physical Resources of Apalachicola Bay and River Watershed and section 4.7.1.1 Physical Resources of the Choctawhatchee River and Bay Watershed.

Biological Resources

Summarized information is provided below. Please refer to section 4.9.1.2, Biological Resources of Apalachicola Bay and River Watershed and section 4.7.1.2, Biological Resources of the Choctawhatchee River and Bay Watershed for additional details.

The Apalachicola Bay Watershed contains primarily undeveloped lands. In summary, agricultural lands account for approximately 36 percent of the watershed and uplands account for 43.2 percent of the watershed (Table 4-31). Combined, these three land types make up approximately 80 percent of the

watershed. The majority of the agricultural lands include cropland and pastureland, row and field crops, and tree crops.

Table 4-31 Acres of habitat in the Apalachicola Bay Watershed – Nutrient Reduction project area

FLUCCS Code	Acres	Percent of Total Area
Developed - Total	**30,165.24**	**37.94**
Agriculture	**21,190.82**	**26.65**
2100 – 2200: Cropland and Pastureland, Row and Field Crops, Tree Crops	20,388.04	25.64
2310: Cattle Feeding Operations	14.16	0.02
2400 – 2600: Nurseries, Specialty Farms, Other Open Land (Rural and Fallow)	788.62	0.99
Residential and Commercial	**6,784.91**	**8.53**
1100 - 1300: Low, Medium, and High Density Residential	4,759.65	5.99
1400 - 1900: Commercial and Services, Industrial, Institutional, Open Land (Urban)	2,025.26	2.55
Transportation, Communication, and Utilities	**1,325.14**	**1.67**
8100 – 8300: Transportation, Communication, Utilities	1,325.14	1.67
Disturbed Land	**864.38**	**1.09**
7400: Disturbed Lands	864.38	1.09
Undeveloped - Total	**49,347.68**	**62.06**
Upland Forest	**34,364.85**	**43.22**
4100: Upland Coniferous Forests	2,069.34	2.60
4200: Upland Hardwood Forests	4,923.79	6.19
4340: Hardwood Coniferous - Mixed	7,881.07	9.91
4410: Coniferous Plantations	15,075.07	18.96
4430: Forest Regeneration Areas	4,415.57	5.55
Wetlands	**12,325.03**	**15.50**
6100: Wetland Hardwood Forests	6,277.44	7.89
6210: Cypress	1,748.25	2.20
6250: Hydric Pine Flatwoods	328.24	0.41
6300: Wetland Forested Mixed	3,051.81	3.84
6400 – 6500: Herbaceous Marsh and Prairie, Intermittent Ponds	919.28	1.16
Rangeland	**2,025.71**	**2.55**
3100: Herbaceous (Dry Prairie)	1,020.73	1.28
3200: Shrub and Brushland	435.16	0.55
3300: Mixed Upland Nonforested	569.82	0.72
Water	**632.08**	**0.79**
5100: Streams and Waterways	175.52	0.22
5200: Lakes	67.92	0.09
5300: Reservoirs	372.52	0.47

FLUCCS Code	Acres	Percent of Total Area
5500: Major Springs	11.45	0.01
5600: Slough Waters	4.67	0.01
Grand Total	**79,512.92**	**100**
Note: values may not add up due to rounding.		

Federally listed species potentially occurring in the project area, as identified through IPaC and FNAI, are listed in Table 4-32 (USFWS 2018a, FNAI 2018). State and federally listed species are listed for the watershed in Appendix E.

Table 4-32 Federally listed species potentially occurring in the Apalachicola Bay Watershed - Nutrient Reduction project area

Common Name	Scientific Name	Habitat	Status	Likelihood
Gray bat	*Myotis grisescens*	Palustrine: caves, various Terrestrial: caves, various	E	Potential
Fat threeridge	*Amblema neislerii*	Riverine: main channels of small to large rivers in slow to moderate currents; fine to medium silty sand, also mixtures of sand, clay, and gravel. Panhandle drainages: Chipola and Apalachicola Rivers	E*(CH)	Potential
Chipola slabshell	*Elliptio chipolaensis*	Riverine: main channel of the Chipola River and its larger tributaries in substrate combinations of silt, clay, sand and occasionally gravel. Panhandle drainages: Chipola River	T*(CH)	Potential
Purple bankclimber	*Elliptoideus sloatianus*	Riverine: small to large rivers in sand, sand mixed with mud, or gravel substrates with slow to moderate currents. Panhandle drainages: Chipola, Apalachicola, and Ochlockonee Rivers	T*	Potential
Tapered pigtoe	*Fusconaia burkei*	Riverine: medium-sized creeks to large rivers, in sand and gravel substrata, occasionally in silty sands, in slow to moderate currents, occasionally in floodplain lakes.	T*(CH)	Potential
Southern sandshell	*Hamiota australis*	Riverine: clear small creeks and rivers with slow to moderate current in sandy or mixtures of sand and fine gravel substrate with woody debris	T*(CH)	Potential
Shinyrayed pocketbook	*Lampsilis subangulata*	Riverine: mid-sized rivers and creeks with a clear or sandy silt floor.	E*(CH)	Potential
Gulf moccasinshell	*Medionidus penincilliatus*	Riverine: medium-sized creeks to large rivers with sand and gravel substrates in slow to moderated currents	E*(CH)	Potential
Oval pigtoe	*Pleurobema pyriforme*	Riverine: medium-sized creeks to small rivers; various substrates; slow to moderate currents	E*(CH)	Potential
Fuzzy pigtoe	*Pleurobema strodeanum*	Riverine: medium-sized creeks to small rivers; various substrates; slow to moderate currents	T*(CH)	Potential
Southern kidneyshell	*Ptychobranchus jonesi*	Riverine: endemic to Choctawhatchee River drainage in Alabama and Florida	T*(CH)	Potential
Choctaw bean	*Villosa choctawensis*	Riverine: large creeks and rivers with moderate current over sand to silty-sand substrates	E*(CH)	Potential

Common Name	Scientific Name	Habitat	Status	Likelihood
Reticulated flatwoods salamander	*Ambystoma bishopi*	Terrestrial: slash and longleaf pine flatwoods that have a wiregrass floor and scattered wetlands	E	Potential
Eastern indigo snake	*Drymarchon couperi*	Estuarine: tidal swamp Palustrine: hydric hammock, wet flatwoods Terrestrial: mesic flatwoods, upland pine forest, sandhills, scrub, scrubby flatwoods, rockland hammock, ruderal	T	Likely
Gopher tortoise	*Gopherus polyphemus*	Terrestrial: sandhills, scrub, scrubby flatwoods, xeric hammocks, coastal strand, ruderal	C	Likely
Gentian Pinkroot	*Spigelia gentianoides*	Terrestrial: mixed hardwood forest, rich humus	E	Potential
Florida torreya	*Torreya taxifolia*	Terrestrial: slope forest, upland mixed forest, and ravines	E	Potential
Wood Stork	*Mycteria americana*	Estuarine: marshes Lacustrine: floodplain lakes, marshes (feeding); Palustrine: marshes, swamps, roadside ditches	E*	Potential to be present while foraging
Red-cockaded woodpecker	*Picoides borealis*	Terrestrial: mature pine forests	E*	Potential
Note: Species determined to be "Unlikely" to be found in the action area are not addressed further in this analysis. E=Endangered, T=Threatened, SAT=Similarity of Appearance (Threatened), C=Candidate, SSC=Species of Special Concern, CH=Critical Habitat.				

4.9.3.3 Environmental Consequences

Section 4.6.5.3 describes the anticipated environmental consequences of the NR1, Pensacola Bay and Perdido River Watersheds - Nutrient Reduction project. While this project is located in a different geographic area, the environmental consequences of the alternative evaluated here, and the Pensacola Bay and Perdido River Watersheds project described in Section 4.6.5.3 are anticipated to be substantially similar. As such, they are not repeated here.

4.9.4 WQ9, MK Ranch Hydrologic Restoration

The project area for the MK Ranch Hydrologic Restoration is part of the larger Apalachicola River and Bay watershed in Franklin and Gulf counties. The geology and more general features of the watershed are described in the Apalachicola River and Bay SWIM Plan (NWFWMD 2017e) and are summarized here as appropriate. Much of the site-specific information presented here is summarized from the *Management Plan for Apalachicola River Wildlife and Environmental Area 2014 – 2024: Franklin and Gulf Counties* (or Management Plan, FWC 2014), which includes the project area. Soils survey and FNAI data are also included as appropriate.

4.9.4.1 Affected Environment

The MK Ranch restoration project area is a management unit of the Apalachicola River Wildlife and Environmental Area (ARWEA), located along the west side of Saul Creek, east of Lake Wimico, and on the north side of the Jackson River in Gulf County. The project area was historically altered for cattle grazing and for hay and soybean farming. The upper Saul Creek marsh in the north portion of the project area was diked, ditched, and drained for rice production. MK Ranch subsequently agreed to restore the

area to previous hydrological conditions and management focuses on conservation and protection of fish and wildlife habitat and fish and wildlife-based public outdoor recreation, per the Management Plan. Actions outlined in the Management Plan include prescribed burning; wildlife habitat restoration and improvement; invasive exotic species maintenance and control; road repairs and maintenance; imperiled species management, monitoring and protection; facilities and infrastructure maintenance and repair; conservation acquisition and stewardship activities; archeological and historic resources monitoring and protection; and research related activities. Environmental conditions described in the Management Plan are summarized here.

Physical Resources

The distance from the confluence of Saul Creek and the Jackson River, at the southern boundary of the of the project area, to the Apalachicola Bay is approximately 3.5 miles (straight line). Historic land use patterns and hydrologic alterations within ARWEA, including road construction, ditch excavation, draining, and construction of dikes and berms have altered water flow patterns and hydroperiods on the area. This has resulted in extensive loss of wetland habitat and alteration of wetland community structure. The Saul Creek basin of ARWEA discharges directly into the Jackson River, which feeds Apalachicola Bay and is tidally influenced upstream to Lake Wimico. These alterations have not only adversely impacted water quality and habitat in ARWEA, but also in Apalachicola Bay by reducing water storage and interrupting freshwater delivery patterns

Clark Creek, Ingram Creek, and Catfish Slough, as well as other unnamed waterbodies, drain the project area and flow into the Jackson River. Lake Wimico, to the west of the project area, drains to the Jackson River, which then flows into the Apalachicola River just east of the project area. The project area is located within the Gulf Coastal Lowlands physiographic province. The surface is relatively flat and characterized by karstic topography and shallow, sandy soils with muck in wetland areas. Elevations range from six feet in the uplands adjacent to the floodplain, to sea level at the mouth of the river and on the area adjacent to East Bay. Maximum elevation in the project area is 28 feet above MSL. The project area includes a large expanse of tidal marshes along its southern boundary, where it joins the Jackson River just above its confluence with the Apalachicola River. Levees, terraces, and flats make up only a small fraction of the floodplain. Levee topography usually has a local relief of five to ten feet. Depth to water table in the project area is generally 0-25 inches bls.

Nearly all (95 percent) of the project area soils are hydric and 90 percent of the project area consists of frequently flooded soils and mucks. Small areas of uplands and/or spoil (5 percent) and associated development are located in the northern portion of the project area, for example, the community along Howard's Creek. Water surface elevations of these soils range from at the surface to 12 inches als to 18 inches below the surface on a seasonal basis. Maurepas mucks also characterize much of the southern portion of the project area, where floodplain tidal marshes become the dominant landscape feature. The seasonal high-water surface for these soils is 12 inches als to six inches bls and fluctuates seasonally and with tide. Natural vegetation includes sawgrass, big cordgrass, and black needlerush. In a few small areas, it includes scattered cypress, bay, and gum trees. Areas of this soil provide excellent habitat for wading birds and other wetland wildlife.

None of the waterbodies in the project area are designated as impaired by the FDEP. No potential geological hazards have been identified within the project area.

Biological Resources

Historically, MK Ranch was intensively altered, i.e., wetlands were ditched and drained and dredge spoil was placed in wetlands for hay, soybean farming, and cattle grazing. Consequently, wetlands were altered. The upper Saul Creek marsh was diked, ditched and drained for rice production. A final consent decree was signed in July 1982 between the EPA and MK Ranch over their illegal dredge and fill operations. Through the settlement, MK Ranch agreed to restore the area to pre-project hydrological and biotic regimes prior to state acquisition.

Ditching and draining alters natural hydrology of the system and eliminates wetlands habitat formerly used by wetland dependent species such as birds and mammals, and interrupts the water corridor that many species, especially fish, use for forage and spawning. It also precludes access of aquatic species such as fish and crayfish to the floodplains during high tide, where they normally forage. The wetland corridor also provides access for larger mammals such as bears to other parts of the floodplain. Runoff from silviculture and agriculture operations also results in erosion and delivery of nonpoint source pollutants such as insecticides, herbicides, equipment lubricants, and other contaminants to downstream waters.

No estuarine waters occur in the project area. Freshwater wetland habitats, particularly floodplain swamp, occur throughout the project area and tidal freshwater wetlands occur at the confluence of Saul's Creek with the Jackson River. Upland habitats are present including hardwood coniferous, coniferous plantations, forest regeneration areas, and agricultural lands. These habitats support significant populations of both rare and common wildlife. The Apalachicola ecosystem has the highest documented diversity of amphibians and reptiles in North America, north of Mexico, as well as the greatest number of freshwater fish species in Florida. Common bird species include bald eagles, osprey, waterfowl, wading birds, brown pelicans, red-shoulder hawks, red-bellied woodpeckers, pileated woodpeckers , rails, shore birds, barred owls , swamp sparrows , and marsh wrens. Deer, raccoons, and opossums are common throughout the project area.

The predominant undeveloped natural system in the approximately 6,533-acre project area is the floodplain swamp/bottomlands (60 percent of the land cover) that follows the Apalachicola and Jackson Rivers and associated creeks and sloughs (Table 4-33). Other natural communities include freshwater marshes (22 percent), and a mix of several other wetland communities making up a total of 18 percent of the project area, but individually comprising less than 5 percent each (e.g., cypress swamp, wet prairies, hydric pine flatwoods). Streams and sloughs make up less than three percent of the project area. Dominant canopy species are bald-cypress, water tupelo, water hickory, and Ogeechee tupelo which may occur in nearly monospecific stand or may occur with a mixture of hardwoods that include red maple, black gum, overcup oak, American elm, ash, planer tree, laurel oak, and sweetbay. Where sandbars occur at times of low water, black willow may form dense stands. The floodplain swamp shifts to freshwater tidal swamp and then to marshes before flowing into the Jackson River. The understory in

these freshwater tidal swamps is typically yaupon, wax myrtle and red maple, along with many of the same herbaceous species listed above that occur in floodplain swamp.

Tidal marshes dominated by sawgrass characterize the lower portion of the project area, where flooding and salinity prevent establishment of trees. Floodplain marshes in the project area are small and scattered in the floodplain, with narrow fringes of bulrush, arrowhead, and pickerelweed can occur along edges of alluvial forests and swamps where there is adequate light through the canopy. The more extensive sawgrass marshes occur where the various distributary channels of Saul, Clark, and Ingram creeks enter the Jackson River at the south of the project area and are similar to the sawgrass marshes throughout the watershed.

Uplands in the project area include silviculture (plantations and regeneration areas) and a mix of hardwoods and pine make up less than two percent of the project area, as well as agriculture. Agriculture makes up less than one percent of the land cover in the project area and is the only developed land use.

Table 4-33 Acres of habitat in the MK Ranch project area

FLUCCS Code	Acres	Percent of Total Area
Developed- Total	**20.83**	**0.32**
Agriculture	**20.83**	**0.32**
2150: Field Crops	5.18	0.08
2153: Hay Fields	9.08	0.14
2610: Fallow Crop Land	6.56	0.10
Undeveloped - Total	**6,512.57**	**99.8**
Uplands	**128.64**	**1.97**
3100: Range Land, Herbaceous (Dry Prairie)	0.35	0.01
4340: Hardwood Coniferous - Mixed	8.43	0.13
4410: Coniferous Plantations	91.98	1.41
4430: Forest Regeneration Areas	28.23	0.43
Wetlands	**6,208.17**	**95.02**
6150: Stream and Lake Swamps (Bottomland)	3,873.77	59.29
6170: Mixed Wetland Hardwoods	26.55	0.41
6210: Cypress	254.39	3.89
6250: Hydric Pine Flatwoods	119.07	1.82
6300: Wetland Forested Mixed	103.31	1.58
6410: Freshwater Marshes	1,441.82	22.07
6430: Wet Prairies	137.07	2.10
6440: Emergent Aquatic Vegetation	115.37	1.77
6460: Mixed Scrub-Shrub Wetland	136.83	2.09
Water	**175.42**	**2.68**
5100: Streams and Waterways	157.50	2.41

FLUCCS Code	Acres	Percent of Total Area
5600: Slough Waters	17.92	0.27
Grand Total	**6,533.39**	**100.00**
Note: values may not add up due to rounding.		

Listed species. A list of federal and state designated species are listed in Appendix E and include habitat descriptions and status for each species. A total of 21 federally listed species may occur in the project area, including four mammals, ten birds, five reptiles, and two fish. Species range from the federally endangered wood stork (*Mycteria americana*) to the threatened eastern indigo snake (*Drymarchon couperi*). No federally designated critical habitat occurs in or proximate to the project area. No federally threatened plant species have been found in the project area. State and federally listed species in the watershed are provided in Appendix E. Federally threatened and endangered species potentially occurring in the project area, as identified through IPaC and FNAI, are listed in Table 4-34 (USWFS 2018a, FNAI 2018).

The FWC would continue efforts to control the establishment and spread of Florida Exotic Pest Plant Council (FLEPPC) Category I or II plant in ARWEA units. Control technologies may include mechanical, chemical, biological, and other appropriate treatments. Treatments utilizing herbicides would comply with instructions found on the herbicide label and employ the BMPs for their application. Numerous invasive plant species occur in ARWEA and the project area, including alligator weed, cogon grass, Japanese climbing fern, torpedo grass, and water hyacinth. Japanese climbing fern is the main exotic invasive species of focus on the ARWEA, it establishes itself on high ground along the river and flood waters spread the spores all over the floodplain, making control difficult. Feral hogs and nine-banded armadillos are also monitored and managed in ARWEA.

Table 4-34 Federally listed species potentially occurring in the proposed MK Ranch project area

Common Name	Scientific Name	Habitat	Status	Likelihood
Chapman rhododendron	*Rhododendron chapmanii*	Palustrine: seepage slope (titi bog); terrestrial: mesic flatwoods; ecotone between flatwoods and more xeric longleaf communities and bogs.	E	Potential
Florida skullcap	*Scutellaria floridana*	Palustrine: seepage slope, wet flatwoods, grassy openings Terrestrial: mesic flatwoods	T	Potential
Godfrey's butterwort	*Pinguicula ionantha*	Palustrine: wet flatwoods, wet prairie, bog; in shallow water; Riverine: seepage slope; in shallow water. Also, roadside ditches and similar habitat	T	Potential
Harper's beauty	*Harperocallis flava*	Palustrine: seepage slope, wet prairie, roadside ditches	E	Potential
Telephus spurge	*Euphorbia telephioides*	Terrestrial: mesic flatwoods; disturbed wiregrass, coastal scrub	T	Potential
White birds-in-a-nest	*Macbridea alba*	Terrestrial: mesic flatwoods; disturbed wiregrass, coastal scrub	T	Potential
Panama City crayfish	*Procambarus econfinae*	Palustrine: wet flatwoods; temporary or fluctuating ponds or semi permanently inundated ditches, also ruderal, roadside ditches and utility easements	P	Potential

Common Name	Scientific Name	Habitat	Status	Likelihood
Eastern indigo snake	*Drymarchon corais couperi*	Terrestrial: mesic flatwoods, upland pine forest, sandhills, scrub, scrubby flatwoods, rockland hammock, ruderal	T	Potential
Gopher Tortoise	*Gopherus polyphemus*	Terrestrial: mesic flatwoods, upland pine forest, sandhills, scrub, scrubby flatwoods, rockland hammock, ruderal	C	Potential
American alligator	*Alligator mississipiensis*	Estuarine: herbaceous wetland Riverine: river, creek, low gradient, medium river, pool, spring/spring brook Lacustrine: shallow water Palustrine: forested wetland, herbaceous wetland, riparian, scrub-shrub wetland	SAT	Potential
Red-cockaded woodpecker	*Picoides borealis*	Terrestrial: mature pine forests	E	Potential
Wood stork	*Mycteria americana*	Estuarine: marshes Lacustrine: floodplain lakes, marshes (feeding), various Palustrine: marshes, swamps, various	T	Potential
Piping plover	*Charadrius melodus*	Estuarine: Prefer open coastal areas including sandy beaches and tidal flats; areas along the shoreline, including the mudflats Terrestrial: dunes, sandy beaches, and inlet areas; mostly wintering and	T	Potential
Red knot	*Calidris canutus rufa*	Estuarine: bays, tidal flats, salt marshes Terrestrial: sandy beaches Marine: aerial, near shore	T	Potential
Note: Species determined to be "Unlikely" to be found in the action area are not addressed further in this analysis. E=Endangered, T=Threatened, SAT=Similarity of Appearance (Threatened), C=Candidate, SSC=Species of Special Concern, CH=Critical Habitat.				

Socioeconomic Resources

The MK Ranch project area is not developed and the closest cities are Port St. Joe and White City in Gulf County and Apalachicola in Franklin County.

4.9.4.2 Environmental Consequences

Only those resource areas for which potential impacts are expected are discussed in detail in for this alternative. The FL TIG analyzed the following resources in more detail below:

- **Physical Resources** – Geology and Substrates, Hydrology and Water Quality
- **Biological Resources** – Habitats, Wildlife Species, Marine and Estuarine Fauna, Protected Species
- **Socioeconomic Resources** – Socioeconomics, Land and Marine Management, Tourism and Recreational Use, Aesthetics and Visual Resources.

Physical Resources

Hydrologic restoration would include actions to reestablish flow ways and the timing of surface water flow and discharges in the project area, such as removing fill, replacing bridges and culverts with appropriate designs, establishing low-water crossings, restoring pre-impact topography and vegetation, and abandoning unneeded roads. Restoration activities would result in broad water resource benefits, including improved water quality, enhanced fish and wildlife habitat, and other restored wetland functions in the project area, which was formerly drained for cattle and silviculture operations. The

project would restore hydrologic function to 6,409 acres of historic forested wetlands and marsh on MK Ranch by reconnecting the natural drainage pathways. It is expected that restoration of MK Ranch would result in greater duration and depth of inundation during flood waters, improved hydroperiods, and reduced erosion and channel sedimentation in the project area and in downstream water bodies. This would help to restore the historic flow regime to the estuary and improve hydrologic connections throughout the ARWEA, thereby restoring some of the lost freshwater flow to Apalachicola Bay. Minor short-term adverse impacts to hydrology or water quality are anticipated as a result of construction activities associated with the project, but impacts would be minimized due to implementation of BMPs.

Construction BMPs would be implemented to minimize short-term temporary impacts to water quality. Long-term benefits to habitats and water quality are anticipated as a result of restored hydrologic regime.

In summary, the project would result in short-term minor adverse and long-term benefits to physical resources.

Biological Resources

The project would restore historic wetland structure and function by reconnecting the natural drainage pathways within the watershed, thereby resulting in long-term, permanent benefits in the project area and to downstream waterbodies such as the Jackson and Apalachicola rivers. This would in turn help to restore a portion of the historic flow regime to the estuary and help improve habitat conditions in stream and wetland habitats of ARWEA and Apalachicola Bay. Vegetation monitoring would occur on the restored area to document shifts in vegetative communities due to changes in hydroperiods as well as to identify (and treat) invasive species in restored and disturbed areas (e.g., backfilled canals). The existing ARWEA management plan includes an invasive species component (Section 5.5) which would be used as a guidance document and updated to reflect changes resulting from the restoration of MK Ranch, as appropriate (FWC 2014).

The project would result in short- and long-term benefits to the species listed above due to restored habitat, access to former floodplain habitat, and improved water quality. Short term and temporary adverse impacts due to construction activities may occur although construction BMPs would be implemented to reduce any potential impacts of construction activities. No adverse impacts to species are expected. The project is consistent with priorities outlined in the Apalachicola River and Bay SWIM Plan (NWFWMD 2017e). The FL TIG would coordinate and complete consultation with relevant regulatory agencies, if necessary, on this project regarding potential impacts to protected species and habitats prior to project implementation.

In summary, the project would result in short-term adverse impacts and short and long-term benefits to biological resources.

Socioeconomic Resources

Due to the proximity of population centers in Franklin and Gulf counties, public use can be expected to increase as public awareness of opportunities increases. The FWC administers hunts in the fall and spring for various game species including small game, deer, turkey, and feral hogs, which account for

many of the user-days. Visitation and public use of the area for fish and wildlife based public outdoor recreational opportunities is the primary source of economic benefits and contribute to the overall economy for this region of Florida. In Fiscal Year 2012-2013 an estimated 133,515 people visited ARWEA, generating an estimated annual economic impact of $26,087,496 (with a multiplier effect) for the State and the panhandle region. This estimated annual economic impact has aided in the creation of an estimated 266 jobs. The project would provide long-term fish and wildlife resource-based public outdoor recreation and educational opportunities, while protecting the natural and cultural resources found on the site.

In summary, the project is anticipated to result in benefits to socioeconomic resources.

4.9.5 WQ10, City of Carrabelle's Lighthouse Estates: Septic Tank Abatement - Phase II (Preferred)

The project would remove 110 onsite treatment and disposal septic systems (OSTDS) from residences in Carrabelle Lighthouse Estates and connect the residences to the sewer system operated by the City of Carrabelle. Construction activities would include installation of sewer line extensions to residential properties within existing ROWs. The project area includes homes and paved roads along the north side of U.S. Highway 98 along Florida's Gulf Coast in Franklin County. The 110 OSTDS would be converted to sewer and subsequent treatment at the City of Carrabelle's WWTF. Of the 163 OSTDS in the subdivision, connection of the first 53 residences (Phase I) has been funded by the State of Florida through the NWFWMD. The project would reduce the nutrient and bacterial loadings from leaking and inadequate OSTDS that are transported to Apalachicola Bay via groundwater.

4.9.5.1 Affected Environment

Carrabelle Lighthouse Estates is located west of the City of Carrabelle and is located approximately 54 miles southwest of Tallahassee, Florida.
U.S. Highway 98 passes through Carrabelle along the Gulf coast. The City of Carrabelle is also the location of the eastern terminus of the Gulf Intracoastal Waterway.

The project area drains to the Apalachicola Bay, which supports significant natural resources, including seagrasses, salt marsh communities, and oyster beds. Drainage occurs via surficial groundwater seepage under US 98 and as surface water flow through culverts. Nearby waters include a public swimming area, Carrabelle Beach, and the bay is extremely important for the productivity of commercial and recreational fisheries. Apalachicola Bay is renowned for its environmental and economic resources and widely recognized as a waterbody of state, national, and international significance. The bay and associated watershed areas have been designated by the U.S. as a National Estuarine Research Reserve and by the United Nations as an International Biosphere Reserve. The Apalachicola River and Bay system is also the highest ranked Surface Water Improvement and Management (SWIM) priority of the Northwest Florida Water Management District.

There are over 23,000 documented or likely occurring OSTDS in the Apalachicola River and Bay watershed. This project area is located within the Lighthouse Estates residential subdivision in Franklin County on the west side of Carrabelle and the Carrabelle River, outside the City limits, but within the

utility service area of the City of Carrabelle. The overall project would connect approximately 163 residences currently served by OSTDS to central sewer and abandon the existing OSTDS.

Physical Resources

Soils in the project area are of the Mandarin-Resota-Leon soil association typical of Northwest Florida coastal sand ridges and islands. These soils are nearly level or gently sloping and include moderately well drained Resota fine sand, somewhat poorly drained Mandarin fine sand, poorly drained Leon sand, and very poorly drained Pickney-Pamlico Complex. Nearly 70 percent (586 acres) of the project area is characterized by the upland sands. Thirty-one percent (258 acres) of the soils in the project area are hydric and primarily depressional soils such as Pickney-Pamlico and Dorovan-Pamlico and Rutlege sands. In wet soils and areas with high water tables, OSTDS may not effectively treat pollutants and nutrients, which can be transported to downstream waterbodies via groundwater. Base flows in the Carrabelle basin have low dissolved oxygen and moderate increases in nutrients, possibly indicative of sewage contamination, perhaps from leaking and poorly maintained septic tanks or aging treatment systems, cross connections, or illicit connections. Without future development, these basins should continue to cause little impact, assuming that current rules requiring adequate stormwater and erosion control practices are followed.

This project site is adjacent to Carrabelle Beach, which has suffered public health exceedances for bacteria. Construction would include sewer line extensions individual connections and abandonment of existing septic systems. The City of Carrabelle presently operates the Kenneth B. Cope AWT Facility with a permitted capacity of 1.20 mgd, although flow in 2015 was only 0.38 mgd, and the reuse capacity is an estimated 1.18 mgd. The city has implemented public access reuse with high-level disinfection. Modest amounts of reclaimed water, 0.1 mgd, were used for prison toilet flushing and subdivision irrigation in Carrabelle. Treated effluent from the facility discharges to a 32.8-acre sprayfield land application site that is owned and operated by the City and is located east of Carrabelle and just north of the WWTF. The project area includes scattered stormwater ponds. Water drains to the bay via surface and ground water flow and no major streams water channels flow through the project area into the adjacent bay.

Biological Resources

Nearly half (47 percent) of the project area is developed and characterized primarily by low and medium density fixed and mobile homes (352.3 acres), with no other individual developed land use accounting for more than 13 acres (Table 4-35).

The project area is typically open sand and slash pine with scattered live oak on the north side of U.S. 98, interspersed with forested wetlands. Undeveloped uplands are typically pine forests and silviculture, like much of the watershed, with natural vegetation associated with the sandy uplands in the project area typically include longleaf pine, slash pine, saw palmetto, gallberry, wax myrtle, and wiregrass, running oak. Open areas, pastures, meadows, and areas overgrown with grasses, herbs, vines, and shrubs support many upland species, for example, bobwhite quail, dove, meadowlarks, field sparrows, cottontail rabbit, and red fox. Forested uplands include animals such as turkey, thrushes, woodpeckers, squirrels, gray fox, raccoon, white-tailed deer, and bear.

Wetlands account for 285 acres (33.79 percent) of the project area and open water accounts for another 4.88 acres (0.58 percent). Undeveloped wetlands include relatively small areas of saltmarsh in protected areas along the bay and freshwater marshes surrounding small freshwater ponds. Typical forested wetland vegetation includes sweetbay, swamp tupelo, black titi, swamp cyrilla, and scattered slash pine However, forested and scrub-shrub wetlands that also characterize most of Franklin County and the Tate's Hell State Forest, 202,437 acres of state land that border the project area to the north and west. Among these are cypress swamps, dwarf cypress swamps, tupelo-cypress swamps, Atlantic white cedar swamps, wet prairie, wet pine flatwoods, and mixed forested wetlands. Wetland habitats include shallow open water, marshes, and swamps that provide habitat for fish and wildlife species such as ducks, geese, herons, shore birds, otter, mink, beaver, and alligator.

Many species of wildlife occur in Tate's Hell State and may use habitat along the edges of the project area. Common species include opossum, armadillo, fox, and coyote, bald eagle, Florida black bear, gopher tortoise, and red-cockaded woodpecker occur in Tate's Hell, along with rare plant species such as thick-leaved water-willow, white birds-in-a-nest, Florida bear grass, Chapman's butterwort, and small-flowered meadow beauty.

SAV is located in Apalachicola along the coast of the project area. The coastal Franklin County 2010 SAV coverage was an estimated 14,611 acres, about half of which was found encompassing Dog Island and the associated reef, Turkey Point, and the Carrabelle River.

Federally listed species are numerous in the undeveloped habitats proximate to the project area and several species may occur in the project area, as identified by IPaC and FNAI, especially listed plant species (Table 4-36; USFWS 2018a, FNAI 2018). Species such as the eastern indigo snake, gopher tortoise, and wood stork are found throughout the region and potentially occur in the project area. Species such as plovers and red knots, however, would be limited to the shore on the south side of U.S. 98 and are unlikely to occur in the project area. State and federally listed species in the watershed are listed in Appendix E.

Table 4-35 Acres of habitat in the City of Carrabelle's Lighthouse Estates: Septic Tank Abatement Phase II project area

FLUCCS Code	Acres	Percent of Total Area
Developed - Total	**398.79**	**47.23**
Urban and Built-Up	**398.79**	**47.06**
1110: Low Density, Fixed and Mobile Units	31.04	3.68
1230: Medium Density, Mixed Units (Fixed and Mobile Home Units)	352.28	41.72
1454: Campgrounds	7.42	0.88
1810: Swimming Beach	2.91	0.35
1900: Open Land	3.70	0.44
7200: Sand Other Than Beaches	1.44	0.17
Undeveloped - Total	**445.63**	**52.77**
Rangeland	**6.05**	**0.72**

FLUCCS Code	Acres	Percent of Total Area
3200: Shrub and Brushland	6.05	0.72
Upland Forests	**149.36**	**17.69**
4100: Upland Coniferous Forests	66.95	7.93
4110: Pine Flatwoods	69.71	8.25
4410: Coniferous Plantations and Regeneration areas	12.70	1.50
Wetlands	**285.34**	**33.79**
6170: Mixed Wetland Hardwoods	1.27	0.15
6250: Hydric Pine Flatwoods	48.30	5.72
6300: Wetland Forested Mixed	110.03	13.03
6410: Freshwater Marshes	15.45	1.83
6430: Wet Prairies, Emergent Aquatic Vegetation,	17.39	2.06
6460: Mixed Scrub-Shrub Wetland	92.90	11.00
Water	**4.88**	**0.58**
5200 and 5300: Lakes and Reservoirs	4.88	0.58
Grand Total	**844.43**	**100.00**
Note: values may not add up due to rounding.		

Table 4-36 Threatened and Endangered Species potentially affected by City of Carrabelle's Lighthouse Estates: Septic Tank Abatement Phase II

Common Name	Scientific Name	Habitat	Status	Likelihood
American alligator	*Alligator mississipiensis*	Estuarine: herbaceous wetland Riverine: river, creek, low gradient, medium river, pool, spring/spring brook Lacustrine: shallow water Palustrine: forested wetland, herbaceous wetland, riparian, scrub-shrub wetland	SAT**	
Eastern indigo snake	*Drymarchon corais couperi*	Terrestrial: mesic flatwoods, upland pine forest, sandhills, scrub, scrubby flatwoods, rockland hammock, ruderal	T	Potential
Gopher Tortoise	*Gopherus polyphemus*	Terrestrial: mesic flatwoods, upland pine forest, sandhills, scrub, scrubby flatwoods, rockland hammock, ruderal	C	Potential
Piping plover	*Charadrius melodus*	Estuarine: exposed unconsolidated substrate Marine: exposed unconsolidated substrate Terrestrial: dunes, sandy beaches, and inlet areas; mostly wintering and migrants	T	Potential
Red knot	*Calidris canutus rufa*	Estuarine: bays, tidal flats, salt marshes Terrestrial: sandy beaches Marine: aerial, near shore	T*	Potential
Wood stork	*Mycteria americana*	Estuarine: marshes Lacustrine: floodplain lakes, marshes (feeding), various Palustrine: marshes, swamps, various	T	Potential
Listed on IPAC and FNAI unless: * = Only listed on IPAC; ** = Only listed on FNAI.				

Socioeconomic Resources

This project area is located within the Lighthouse Estates residential subdivision in Franklin County on the west side of Carrabelle and the Carrabelle River, outside the City limits, but within the utility service area of the City of Carrabelle. Carrabelle had a population of 2,776 people in 2016, with a median age of 37.1. Approximately 69.5 percent of the City is white, 27.6 percent black, and the remaining mixed race or other. A total of 72.8 percent of the population are high school graduates or greater and 7.7 percent

have a bachelor's degree or higher. The U.S. Census Bureau reports that Carrabelle has a poverty rate of 25.3 percent in 2016.

Nearby public swimming area and the bay are extremely important for the productivity of commercial and recreational fisheries. The Florida Department of Health monitors recreational beaches, including Carrabelle Beach, for enterococcus bacteria, and issues health advisories or warnings when bacterial counts exceed safe levels. Beaches with more than 21 closures in a year are classified as "impaired" by FDEP and Carrabelle beach is one of them. Extending sewer service to areas that currently rely on conventional OSTD systems for wastewater treatment and disposal have been identified as a means of improving wastewater treatment and reducing loadings of bacteria, nutrients, and other pollutants to downstream receiving waters.

4.9.5.2 Environmental Consequences

Only those resource areas for which potential impacts are expected are discussed in detail in for this alternative. The FL TIG analyzed the following resources in more detail below:

- **Physical Resources** – Geology and Substrates, Hydrology and Water Quality
- **Biological Resources** – Habitats, Wildlife Species, Marine and Estuarine Fauna, Protected Species
- **Socioeconomic Resources** – Socioeconomics, Land and Marine Management, Tourism and Recreational Use, Aesthetics and Visual Resources.

Physical Resources

The project would improve water quality in Apalachicola Bay and St. George Sound by connecting homes currently served by septic systems to a central wastewater treatment system. Bacterial pollution from former septic systems in the project area would be eliminated and nutrient exports to the bay would be reduced. Connection of all 163 septic systems to the City of Carrabelle's wastewater treatment plant would eliminate export of microbial pathogens from the connected parcels. Additionally, nitrogen loading to Apalachicola Bay would be reduced by approximately 3,000 pounds per year due to the significantly improved water quality treatment achieved by the city's wastewater plant as compared with that provided by the individual septic systems.

No significant impacts to soils are expected. The removal of 110 septic systems and connection of the homes to central wastewater treatment system would result in some ground disturbance and impacts to vegetation, but would be concentrated in areas that are already disturbed. Soil and land surveys may have temporary, short-term, adverse impacts on soils and vegetation, induce erosion, displace sand, cause temporary changes to elevation contours, and/or result in soils compaction but impacts would be minimized due to implementation of BMPs. Construction of the wastewater collection lines and would occur in road ROWs or already disturbed areas.

This project would directly reduce the discharge pollutant loading that otherwise would impact the health and quality of estuarine habitats in receiving waters. Completion of the project would also help to reduce the potential for beach closures, restrictions on shellfish harvesting, and human health impacts from microbial pathogens.

Extending the central sewer system into the project area would also limit installation of additional septic systems within the Lighthouse Estates area. Any future development would be required to connect to the central sewer system, providing further protection for Apalachicola Bay.

In summary, the project would result in short-term minor adverse impacts and long-term benefits to physical resources.

Biological Resources

Temporary, minor, and short-term disturbance to uplands in the project area are anticipated due to the removal of septic tanks and installation of sewer pipes in the project area. Construction activities include installation of sewer line extension to residential properties within existing rights-of-way. Construction activities are limited to the Lighthouse Estates subdivision and do not include in-water activities. No adverse impacts to habitats, fish and wildlife, or listed species are expected. The project would provide long-term beneficial impacts to estuarine and marine species in St. George Sound and Apalachicola Bay due to the decrease in effluent discharge to St. George Sound resulting from replacement of existing septic tanks with connected sewer lines and subsequent water treatment. The FL TIG has begun coordinating with the relevant regulatory agencies related to potential impacts to protected species and habitats.

Adjacent coastal waters are critical habitat for the Gulf sturgeon and loggerhead sea turtle, however, no construction activities would be conducted within those habitats.

In summary, the project would result in short-term minor adverse impacts and long-term benefits to biological resources.

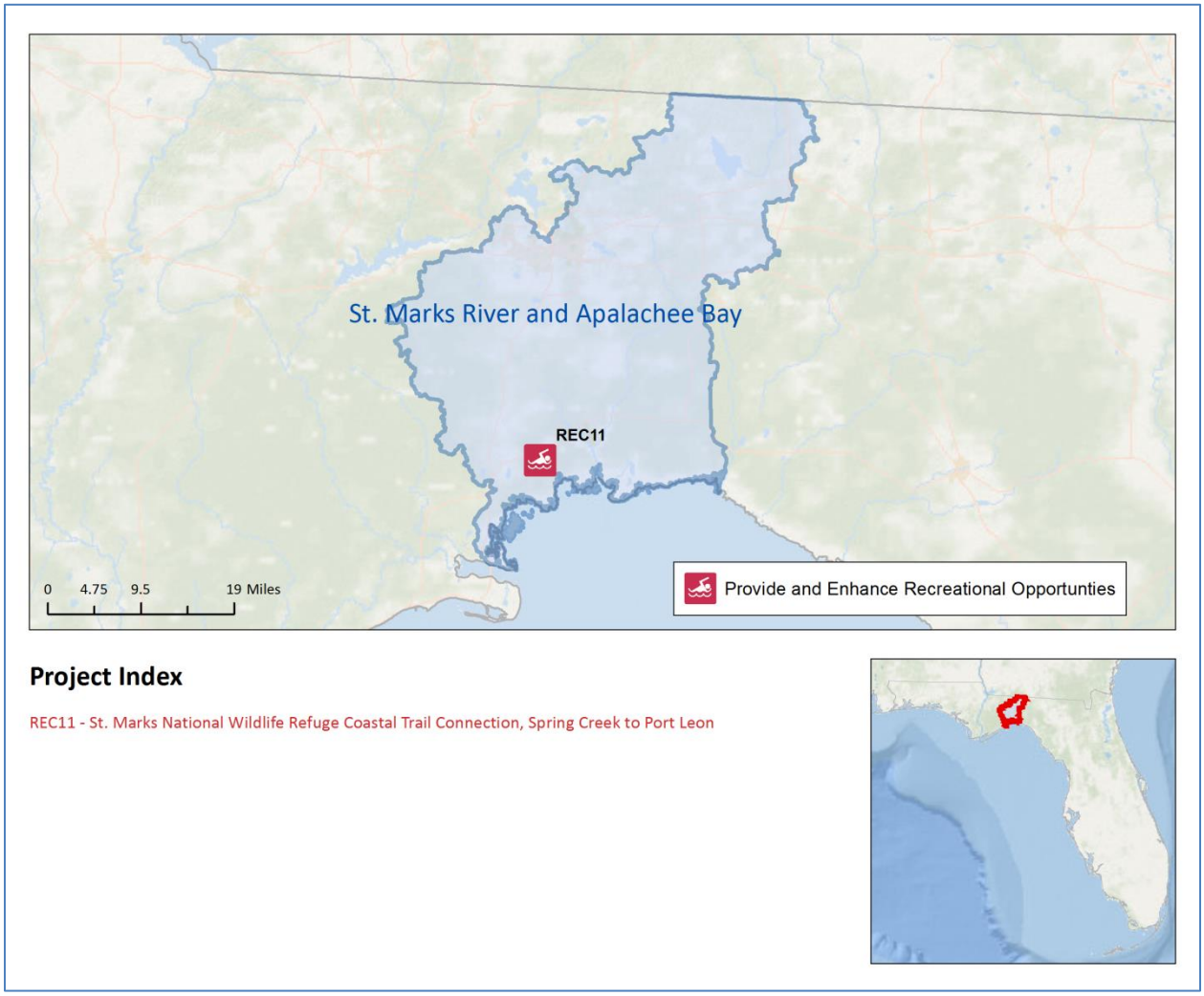
Socioeconomic Resources

The project would be expected to result in short-term increase in construction jobs. During the construction phase of this project, construction equipment and operations would likely be located along in previously disturbed areas and parking lots. To the extent required, the use of construction equipment, including equipment used for the movement and placement of materials (i.e., barges) and barriers enacted to protect public safety would result in some minor to moderate short-term adverse impacts on aesthetics and visual quality. These impacts result from the presence of equipment, barriers and construction-related dust and emissions. During the construction period, visible impedances would detract from the natural landscape and create visual contrast for observers. Short-term closures of public areas may be required to accommodate construction activities, which could adversely affect visitors.

In summary, this project would reduce the potential for beach closures due to water quality impairments, which would improve tourism and access to recreational activities, providing long-term benefits.

4.10 St. Marks River and Apalachee Bay Watershed

Figure 4-20 Projects in St. Marks River and Apalachee Bay



As shown in Figure 4-20, one project is located in St. Marks River and Apalachee Bay watershed: the St. Marks National Wildlife Refuge Coastal Trail Connection, Spring Creek to Port Leon project (REC11).

4.10.1 REC11, St. Marks National Wildlife Refuge Coastal Trail Connection, Spring Creek to Port Leon (Preferred)

St. Marks NWR is adjacent to Apalachee Bay in Wakulla County. The Florida National Scenic Trail (FNST) goes through this NWR; the improvements for this project are proposed within the NWR at two areas along the FNST, Spring Creek and Port Leon (Figure 4-21 and 4-22). Specifically, the project would include:

- Construction of a FNST St. Marks NWR segment to complete the Spring Creek trail segment, which includes two boardwalks and puncheons (trail-parallel sills near ground-level,

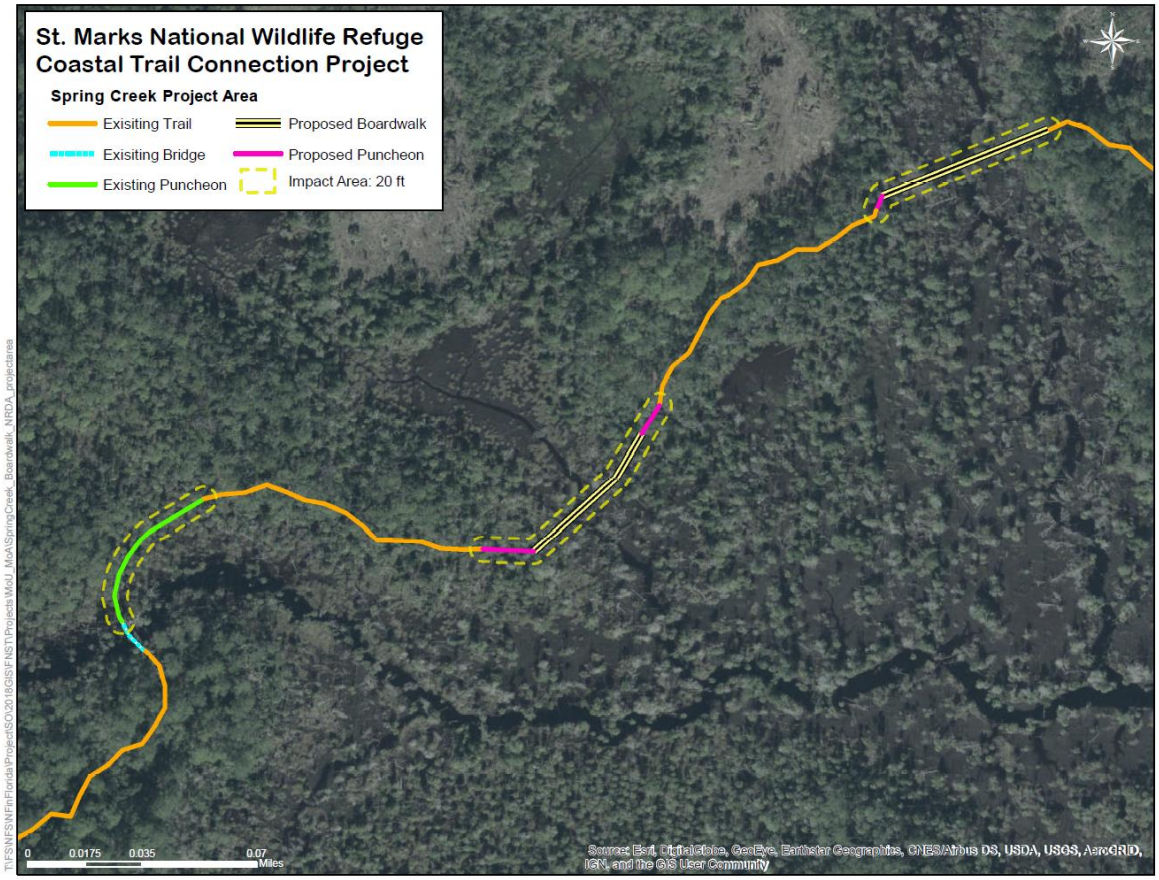
approximately 70 x 3 feet). The puncheon would utilize pilings located at 12-foot intervals and would not have railings;

- Construction of infrastructure improvements in Port Leon Wilderness, including 3-4 small-span bridges or boardwalks ranging from 165-300 feet x 3 feet;
- Construction of a suspension bridge spanning approximately 0.5 acres (approximately 44-50 x 4 feet);
- Construction of one 65-foot wood stringer bridge, to enhance connectivity;
- Development of interpretive materials featuring the natural environment and trail system. Materials would focus on sensitive cultural resources and would be developed in consultation with USDA archeological staff.

These additions would enhance the public's access to the surrounding natural resources and enhance recreational experiences. Additional details on the project are provided in Chapter 2 (Section 2.5.4).

Figure 4-21 Florida National Scenic Trail and General Location of Trail Improvements

Figure 4-22 Conceptual Improvements for the FNST in Spring Creek, St. Marks National Wildlife Refuge



4.10.1.1 Affected Environment

Physical Resources

The St. Marks NWR is located on the Gulf Coastal Lowlands. Within the Gulf Coastal Lowlands, the NWR is located in the Woodville Karst Plain (USFWS 2006). Karst topography, which is characterized by the presence of sinkholes and caves, dominates the NWR. The action area is flat and low-lying. The soils in the Spring Creek area are predominantly Rutlege Sand, and the soils near the Port Leon action area are predominantly Chaires-Charies, wet, fine sands (USDA NRCS 2018). The action areas within the NWR are near Spring Creek, which drains into Oyster Bay, and the St. Marks River. In the 1930s and 1940s, dikes were constructed to create impoundments for waterfowl habitat at the NWR. Historically, water flowed consistently through the NWR from land to the north and discharged into the Apalachee Bay. Recently, water flows into the NWR's impoundments have been inconsistent compared to those experienced historically. The NWR is within the St. Marks and Ochlockonee watersheds, and the action area is within the St. Mark's watershed. The Wakulla River is the largest tributary of the St. Marks River. The St. Marks River, Wakulla River and Ochlockonee River are designated OFWs. There are FEMA designated flood zones AE and VE within the action area (FEMA 2018).

Biological Resources

The major habitat communities within the NWR are coastal salt marshes, hardwood swamps, hardwood hammocks, and upland pine communities (USFWS 2006). The dominant vegetation in the salt marshes includes black needlerush, smooth cordgrass and salt meadow cord grass. The hardwood forests and hammock are dominated by several vegetative species including the pond cypress, cabbage palm, live oak, water oak, red maple, blackgum, Southern, magnolias, and sweetbay magnolias. The upland pine communities contain diverse vegetation characterized by pine overstory and herbaceous understory. Longleaf, slash, pond, and loblolly pine are common. The action area is located primarily in the hardwood swamps and hammock habitats within the NWR. According to the most recent National Wetlands Inventory, there are various freshwater emergent and freshwater forested/shrub wetlands in the action areas (USFWS 2018b).

There is no SAV in the action area. There are, however, SAV beds in the Big Bend Seagrasses Aquatic Preserve, which is located in the submerged lands along the coastline from the mouth of the St. Marks River in the NWR to the Withlacoochee River in Levy and Citrus Counties, but none are within the action areas. There is EFH in St. Marks River near the Port Leon site for coastal migratory pelagics, stone crabs, reef fish, shrimp, and red drum, but there are no EFH near the Spring Creek action areas.

Fish and wildlife potentially present in and around the action areas include migratory birds and select aquatic and terrestrial protected species. Migratory birds could potentially use this site for nesting, foraging, roosting, and breeding. Potential migratory bird groups include wading birds (e.g., rails), shorebirds (e.g., terns, plovers, skimmers), raptors (e.g., eagles, kites), and songbirds (e.g., sparrows, warblers, woodpeckers). There is potential for bald eagles to be present at this site (USFWS 2018a). Although these species could occur on the parcel, they are not known to inhabit or nest in the action areas or in the nearby vicinity.

The list of federally threatened, endangered, proposed, candidate, and other species of concern for this site, as identified through USFWS IPaC, is presented in Table 4-37 (USFWS 2018a). There is no terrestrial or aquatic critical habitat in the action areas for the project. A list of all state and federally listed species found in this watershed is presented in Appendix E.

Table 4-37 Federally listed species potentially occurring in the St. Marks National Wildlife Refuge Coastal Trail Connection, Spring Creek to Port Leon project area

Common Name	Scientific Name	Habitat	Status	Likelihood
Godfrey's butterwort	*Pinguicula ionantha*	Palustrine: wet flatwoods, wet prairie, bog; in shallow water; Riverine: seepage slope; in shallow water. Also, roadside ditches and similar habitat.	T	Unlikely
Frosted flatwoods salamander	*Ambystoma cingulatum*	Palustrine: wet flatwoods, dome swamp, basin swamp, Terrestrial: mesic flatwoods (reproduces in ephemeral wetlands within this community).	E	Potentially
Striped newt	*Notophthalmus perstriatus*	Lacustrine: Shallow water Palustrine: Forested Wetland, Herbaceous Wetland, Riparian, Temporary Pool Terrestrial:	C	Likely

Common Name	Scientific Name	Habitat	Status	Likelihood
		Woodland - Conifer, Woodland – Mixed.		
Eastern indigo snake	*Drymarchon corais couperi*	Terrestrial: mesic flatwoods, upland pine forest, sandhills, scrub, scrubby flatwoods, rockland hammock, ruderal.	T	Potentially
Gopher tortoise	*Gopherus polyphemus*	Terrestrial: sandhills, scrub, scrubby flatwoods, xeric hammocks, coastal strand, ruderal.	C	Potentially
Red-cockaded woodpecker	*Picoides borealis*	Terrestrial: mature pine forests.	E	Potentially
Wood stork	*Mycteria americana*	Estuarine: marshes Lacustrine: floodplain lakes, marshes (feeding); Palustrine: marshes, swamps, roadside ditches.	T	Potentially
Note: Species determined to be "Unlikely" to be found in the action area are not addressed further in this analysis. E=Endangered, T=Threatened, SAT=Similarity of Appearance (Threatened), C=Candidate, SSC=Species of Special Concern, CH=Critical Habitat.				

Socioeconomic Resources

The project is located in the Panacea Management Unit of St. Marks NWR along the Spring Creek FNST segment, which is administered by the USFWS. Tourists pay an entrance fee to use the park amenities. St. Marks contains a number of cultural and educational resources including coastal marshes, islands, tidal creeks, diverse plant and animal species and the estuaries of seven rivers. The St. Marks Lighthouse (built in 1842) is located on the western extent of the park and is listed on the national historic registry. The NWR is open year-round, daylight hours and contains a visitor center that provides regular educational opportunities (both free and for a fee). The current land use classification for the parcel is forest, parks and recreational areas. The property is owned by the U.S. government.

St. Marks National Wildlife NWR is located in Wakulla County. Wakulla County has a population of 32,120 and is demographically similar to Florida and the U.S. as a whole, as shown in Appendix D. The percent of white individuals in Wakulla County (82.4 percent) is higher than to the State of Florida and the U.S., both approximately 77 percent (U.S. Census Bureau 2018). The percent of the population (aged 25 or older) with a high school education is the same as the State of Florida and for the U.S. (both 87 percent) The percent of the population (aged 16 or older) in the labor force in Wakulla County (56.5 percent) is lower than the State average and average U.S. levels (58.5 percent and 63.1 percent respectively) (U.S. Census Bureau 2018). Median household income ($54,078) is higher than the U.S. ($55,322) and Florida averages ($48,900). The percent of the population living in poverty is slightly higher in Wakulla County (13.1 percent) than is typical in the U.S. (12.7 percent), but lower than the Florida average (14.7 percent); U.S. Census Bureau 2018).

Existing infrastructure located at St. Marks National Wildlife NWR includes eight trails, boardwalks, public restrooms, multiple parking lots, visitor centers, camping areas, and picnicking pavilions. There are no existing structures in the area of the proposed trail. There are no designated protected view sheds in the vicinity of this project.

4.10.1.2 Environmental Consequences

Only those resource areas for which potential impacts are expected are discussed in detail in for this alternative. The FL TIG analyzed the following resources in more detail below:

- **Physical Resources** – Geology and Substrates, Hydrology and Water Quality
- **Biological Resources** – Habitats, Wildlife Species, Marine and Estuarine Fauna, Protected Species
- **Socioeconomic Resources** – Socioeconomics, Land and Marine Management, Tourism and Recreational Use, Aesthetics and Visual Resources.

Physical Resources

Implementation of this project could include use of heavy construction equipment, such as bulldozers, barges, trucks, backhoes, tractor trailers, cranes, small barges with crane, small excavators, fork lifts, asphalt machine, roller, small power tools, generators, small trucks, and hand tools.

This project does not include in-water work for the installations of pilings for the boardwalks and bridge. The boardwalks would be situated so the support piles are located in upland areas, with only the span crossing over wetlands, where practicable. The boardwalks would be designed to minimize wetland impacts. Placement of new piles for boardwalk and bridge construction would use the least invasive techniques (e.g., jetting, pushing, or driving the piles) where possible, but could use impact hammers given substrate and construction cost considerations. Terrestrial dredging or digging associated with installation of the pilings for the boardwalks and small bridges is not anticipated. Digging in terrestrial environment for the stringer and suspension bridges may require digging depending on final design. As such, soil and substrate displacement and compaction from piling installation is expected, and digging is potentially anticipated for larger bridges. Depth and volume would be subject to final design, but the area of pilings installed would likely be less than 300 square feet.

Construction and digging activities, including staging areas for construction equipment, would utilize existing development footprints and disturbed areas where possible (e.g., current road footprint), but digging and staging equipment would likely disturb some soils. Although development of the bridges and boardwalks would impact soils, they would direct and condense car/bike/foot traffic into designated areas, minimizing adverse impacts to the overall site, streams, and rivers. Terrestrial work that may affect hydrology and water quality includes construction activities which could temporarily impact water quality from increased runoff.

Specific mitigation measures would be implemented during construction to minimize erosion and overall soil impacts. Construction involving digging and ground disturbances from the bridges and boardwalks would have short-term minor and long-term adverse impacts on geology and substrates. This project would result in short-term minor adverse impacts on water quality due to construction activities.

In summary, the project would have short-term and long-term adverse minor impacts to physical resources.

Biological Resources

Construction activities in terrestrial habitats, wetlands, and over/adjacent to waterbodies (i.e., creeks, rivers) could result in short-term impacts to aquatic habitat due to erosion and increased turbidity during construction. The release of sediments during terrestrial construction would be controlled using BMPs and mitigation to protect aquatic habitat, prevent the transport of sediment into waterways, confine impacts to construction sites, and minimize the magnitude of the impacts on water quality in adjacent waterbodies.

The boardwalks would be situated so the support piles are located in upland areas, with only the span crossing over wetlands, where practicable. The boardwalks would be subject to regulatory consultations depending on the final design. Any work in wetland habitat would be coordinated with the USACE pursuant to the CWA Section 404 and RHA. Coordination with the USACE and final authorization pursuant to CWA/RHA would be completed prior to final design and construction. There is no SAV in the action areas, but there is SAV in Apalachee Bay, all along the shoreline of St. Marks NWR. Due to the upland nature of work with temporary increases in sediments in streams, creeks, and rivers, there are no anticipated effects to SAV. While there is EFH in the St. Marks River, there are no in-water activities; short-term minor increases in suspended sediments may result from construction activities for the bridges, but there are no effects anticipated to EFH resulting from the project. Specific conservation and mitigation measures would be implemented during the finalization of engineering and design plans and construction to minimize erosion and overall habitat impacts.

Construction equipment and staging areas could impact habitat, but as noted previously, these would be sited on existing development footprints where possible to minimize impacts. Although the bridges and boardwalks could potentially impact habitats and biological resources (e.g., clearing of vegetation), most of the improvements are proposed for currently disturbed areas along the FNST. Additionally, the boardwalks and bridges would direct and condense foot traffic into designated areas, minimizing adverse impacts to the habitats, specifically riparian and wetland habitats near creeks, rivers, and inundated areas, over the long-term.

The FL TIG would coordinate with the USFWS and review this project for impacts to bald eagles and migratory birds in accordance with the Bald and Golden Eagle Protection Act (BGEPA) of 1940 (16 U.S.C. §§ 668–668d) and the Migratory Bird Treaty Act of 1918 (MBTA) (16 U.S.C. §§ 703–712) to ensure that appropriate conservation measures and BMPs would be incorporated into the project.

To the extent possible, construction activities would avoid specific habitat locations onsite if there are known nesting birds and avoid nesting seasons. Pre-construction nesting surveys for migratory birds and raptors would be conducted and if evidence of nesting is found, the FL TIG would coordinate with the USFWS to develop and implement appropriate conservation measures. At a minimum, trees/shrubs with active nests would be flagged and avoided. To avoid or minimize impacts to migratory birds from increased human activity, boardwalks would divert and concentrate recreational users away from any important nesting, foraging, or rookery locations. Additionally, signage could be installed along trails, boardwalks, and picnic locations to provide users information on sensitive species in the area and actions to take to avoid or minimize impacts to sensitive species. Foraging and resting birds may

temporarily be displaced during construction or recreation activities. Bird roosting would not be affected because construction activities and most human use would occur during daylight hours.

The FL TIG has begun coordinating with the relevant regulatory agencies related to potential impacts to protected species and habitats. Conservation measures recommended during formal consultation would be incorporated into final project design and implementation to avoid and/or minimize impacts to protected species and critical habitats. Specific conservation measures would also be implemented during construction to avoid and minimize disruption and overall impacts to protected species. Below is a list of potential protected species at the action areas for St. Marks NWR, effects from the project activities, and potential conservation measures.

Gopher tortoise: Existing uplands at this site include wetland habitat, salt marshes, hardwood swamps, hardwood hammocks, and upland pine communities, providing potential habitat for the Gopher tortoise. There are gopher tortoise populations in St. Marks NWR. Improvements that destroy gopher tortoise habitat would directly impact these species, however, the proposed improvements would avoid impacts to burrows, the tortoise, and its habitat, where feasible. Under Florida state law, gopher tortoises must be relocated prior to land clearing or development activities. If gopher tortoises are found in the area affected by the construction of the bridges and boardwalks, they would need to be relocated. If suitable habitat is present, a survey would be conducted to identify any possible gopher tortoise burrows. If any burrows are encountered in construction and staging areas, they would need to be relocated (after consulting with USFWS). As such, no direct or indirect adverse effects on the gopher tortoise are anticipated.

Eastern indigo snake: The Eastern indigo snake is found on St. Marks NWR. Potential impacts to the Eastern Indigo Snake include dust, noise, and habitat destruction. This species is mobile and would likely exit the area during construction. BMPs would be used to minimize impacts to snakes. The USFWS Standard Protection Measures for the Eastern indigo snake would be implemented if any evidence of the Eastern indigo snake is found in the action area. If any burrows are encountered in construction and staging areas, they would need to be relocated (after consulting with USFWS). It frequently co-inhabits gopher tortoise burrows, thus, if encountered, the Eastern indigo snake would be subject to the same removal and relocation efforts. The USFWS Standard Protection Measures for the Eastern Indigo Snake would be implemented if any evidence of the Eastern Indigo Snake is found in the action area (USFWS 2013). Hence, while this project may affect the Eastern indigo snake, it is not likely to adversely affect this species.

Wood stork: This species is documented as occurring on the site. While there are no known nest sites, they do use the site for roosting and foraging. Construction activities could disrupt resting and foraging activities, but the birds would likely move to a different location if disturbed. Because this site has preferable habitat for the wood stork, the proposed improvements and activities at the site during construction could affect the species, but it is unlikely to adversely affect the species.

Red-cockaded woodpecker: This species is documented as occurring on the site. The NWR is involved in recovery efforts for this species. As such, their locations are known, protected, and would be avoided

with these improvements. The species lives and utilizes pine habitat, as long as no pine trees are removed, there would be no effect on the species. As such, pine removal would be avoided wherever possible and feasible. This project may affect red-cockaded woodpecker, but it is unlikely to adversely affect this species.

Frosted flatwoods salamander: There is preferable habitat for the frosted flatwoods salamander at the NWR and they have been observed in slash pine flatwoods and sawgrass ponds. If any frosted flatwoods salamanders are encountered onsite, construction would be halted and USFWS would be contacted. While this project may affect the frosted flatwoods salamander, it is unlikely to adversely affect this species.

Striped newt: There are sandhill habitat, scrubby flatwoods, mesic flatwoods, and wetland habitats on the NWR. As such, the striped newt is known or suspected to occur on the NWR. If any striped newts are encountered onsite, construction would be halted and USFWS would be contacted. While this project may affect the striped newt, it is unlikely to adversely affect this species.

Short-term as well as long-term adverse impacts to biological resources would occur onsite as a result of construction and site preparation activities. Long-term impacts associated with habitat and wildlife disturbance from visitors on the site are anticipated to be minor.

In summary, because the construction activities would be localized to the site and habitat fragmentation would be limited, impacts from this project to biological resources would be minor, adverse, short- and long-term.

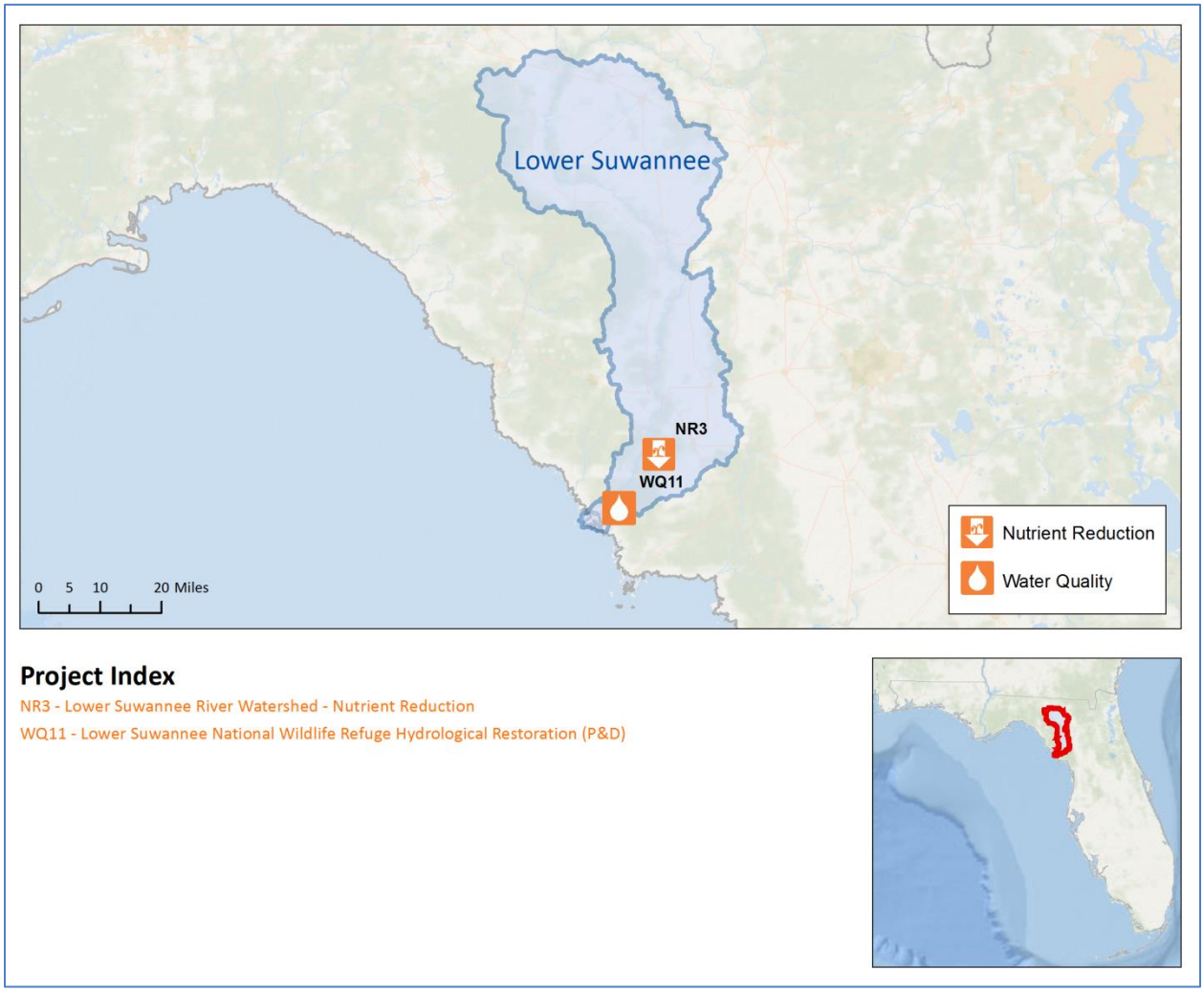
Socioeconomic Resources

The project would be expected to result in short-term increase in construction jobs. During the construction phase of this project, construction equipment and operations would likely be located along in previously disturbed areas and parking lots. To the extent required, the use of construction equipment, including equipment used for the movement and placement of materials (i.e., barges) and barriers enacted to protect public safety would result in some minor to moderate short-term adverse impacts on aesthetics and visual quality. These impacts result from the presence of equipment, barriers and construction-related dust and emissions. During the construction period, visible impedances would detract from the natural landscape and create visual contrast for observers. Short-term closures of public areas may be required to accommodate construction activities, which could adversely affect visitors. From the public perspective, the site would be managed as it is at present, by the USFWS, and improvements should enhance visitor experiences at the park.

In summary, the project is anticipated to result in short-term minor adverse impacts to existing infrastructure and utilities, aesthetics and visual resources, and tourism and recreation. However, the project improvements would provide benefits and amenities to park visitors over the long-term.

4.11 Suwannee River Watershed

Figure 4-23 Projects in Suwannee River Watershed



As shown in Figure 4-23, two projects are located in the Suwannee River and Bay watershed:

- NR3, Lower Suwannee River Watershed - Nutrient Reduction; and
- WQ11, Lower Suwannee National Wildlife Refuge Hydrologic Restoration (P&D).

The assessment for the Lower Suwannee National Wildlife Refuge Hydrologic Restoration (P&D) project (WQ11) is included under section 4.3 Alternatives Proposed for Planning and Design.

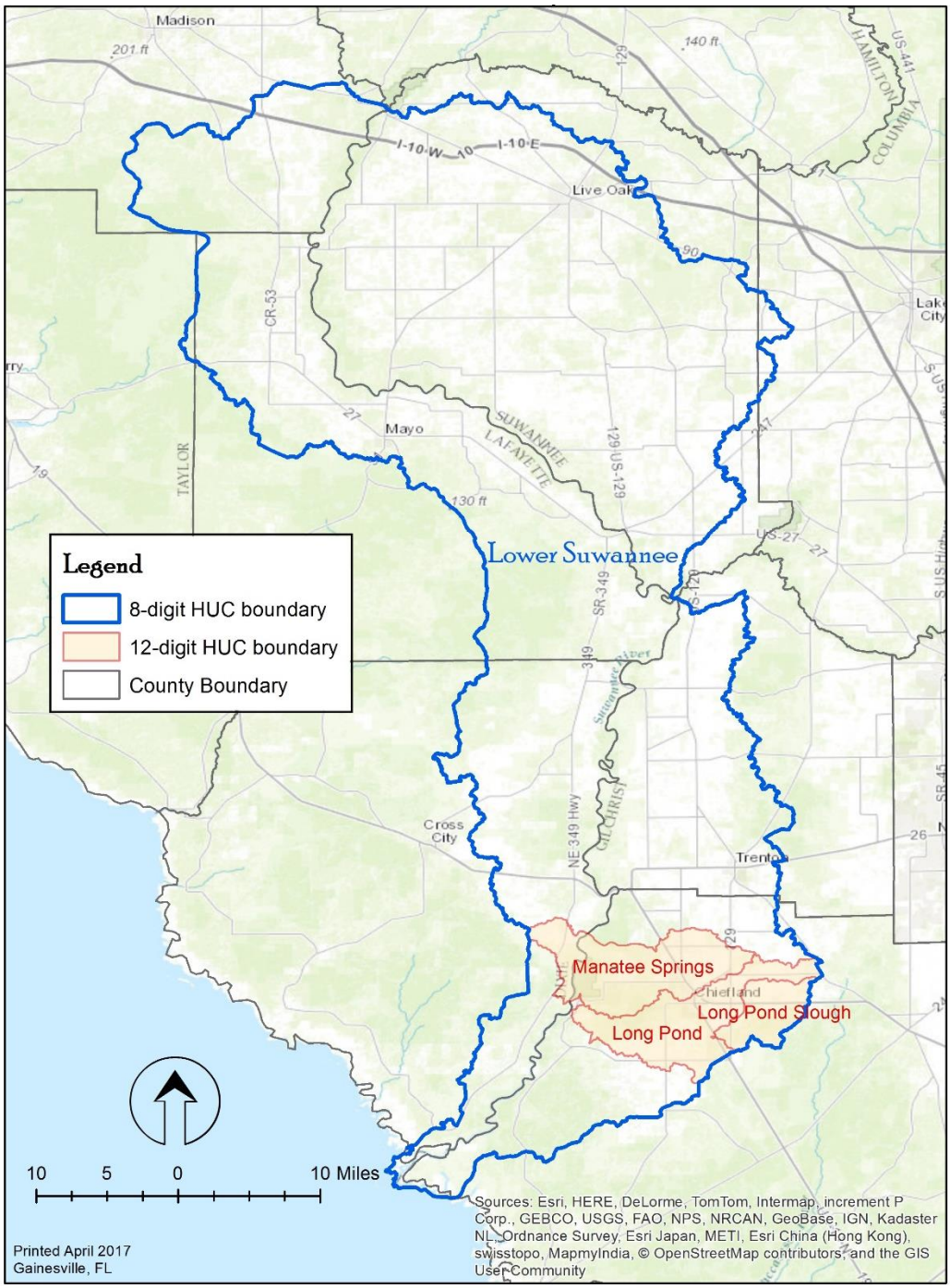
The Suwannee River is about 246 miles long and is the second largest river system in Florida based on mean annual flow and drains approximately 9,950 square miles, of which about 57 percent is located in Georgia. The river flows from the Okefenokee Swamp through the remains of an earthen sill constructed in 1960 to provide fire protection for the Okefenokee National Wildlife Refuge (NWR). Originating at its headwaters in the Okefenokee Swamp in southeastern Georgia, the Suwannee River flows south and southwest, gaining significant volume from the Alapaha, Withlacoochee, and Santa Fe rivers, to its mouth at the Gulf of Mexico, about 15 miles northwest of Cedar Key. The Lower Suwannee River watershed includes approximately 1,578 square miles in five counties between the Suwannee River estuary on Florida's Big Bend region and just south of the Florida-Georgia state boundary, where the upper Suwannee River watershed begins and extends into Georgia. The Suwannee River Water Management District recently completed the updated SWIM plan for the watershed (SRWMD 2017) and the information presented here is summarized from that document unless otherwise cited.

4.11.1 NR3, Lower Suwannee River Watershed - Nutrient Reduction (Preferred)

The goals of the project are to 1) improve water quality by reducing nutrient loads to coastal watersheds 2) develop conservation plans on agricultural land to address nutrient and sediment runoff; and 3) implement conservation practices identified in the conservation plans. The project would be implemented by USDA in the Lower Suwanee River watershed in three HUC12 watersheds: Long Pond, Long Pond Slough, Manatee Springs (as shown in Figure 4-24).

USDA and its conservation partners would help voluntarily participating landowners by developing conservation plans that identify natural resource concerns and conservation practices landowners can implement to reduce nutrient and sediment runoff. Section 4.6.5, NR1 Pensacola and Perdido Key Watersheds Water Quality-Nutrient Reduction provides a more detailed description of the actions that would be conducted as part of this action. Additional details on the project are provided in Chapter 2 (Section 2.5.2).

Figure 4-24 Lower Suwannee River Watershed – Nutrient Reduction



4.11.1.1 Resources Analyzed in Detail for this Alternative

Table 4-19 identifies how resources are assessed for the Nutrient Reduction Alternatives. Only those resource areas for which potential, adverse impacts are expected are discussed in detail in this draft RP/EA. The FL TIG analyzed the following resources in more detail below:

- **Physical Resources:** Hydrology and Water Quality
- **Biological Resources:** Habitats, Wildlife Species, Protected Species, Marine and Estuarine Fauna

4.11.1.2 Affected Environment

The project area surrounds the City of Chiefland in Levy County, Florida, in an area dominated by agricultural operations, primarily row crops (e.g., peanuts) and silviculture (e.g., planted pine), but also includes Manatee Springs, a designated Outstanding Florida Spring, popular recreation area, and manatee refuge.

Physical Resources

The rivers and streams in the lower Suwannee River watershed remain free flowing (e.g., not impounded or dammed). The lower Suwannee River watershed occurs in two major physiographic provinces: the Northern Highlands and Gulf Coastal Lowlands. Elevations in the Northern Highlands generally range from 100 - 200 feet above MSL and occur over gently rolling hills. Soils typically range from sand to clayey sand. Clayey sediments in the subsurface retard infiltration of rainwater. Because of the relatively low permeability sediments at or near the surface, local rainfall drainage forms surface water features. The Cody Scarp is a conspicuous geomorphologic feature that represents the break between the surface water dominated hydrology of the Northern Highlands, and the groundwater dominated hydrology of the Coastal Lowlands. The Cody Scarp region is characterized by active sinkholes, springs, sinking streams, and river rises. During average and lower flows, except for the Suwannee River, all rivers and streams are completely captured by sinkholes as they cross the Cody Scarp. Some subsequently re-emerge down gradient as river rises. Elevations in the Gulf Coastal Lowlands range in elevation from sea level to about 100 feet above MSL and are characterized by low relief, karstic topography, and shallow sandy soils with muck in many wetland areas. In contrast with the Northern Highlands, the Gulf Coastal lowlands have a groundwater-dominated (subsurface) drainage pattern throughout much of this region.

In the 2014 Comprehensive Verified Impaired List, FDEP identified water quality impairments for more than 70 waterbodies within upper and lower watersheds. More than half of all impairment determinations were based on exceedance of bacterial standards, which are in turn based on the criteria for fecal coliform bacteria. Nutrient impairments were numerous and were associated with findings of low DO, elevated levels of chlorophyll-a (chla) and/or exceedance of existing (at the time) criteria for FDEP's Trophic State Index (TSI). Many of the impairments of water quality in the Santa Fe and Suwannee River watersheds were based on water quality criteria that have changed in recent years. Increasing trends in phosphorus concentrations have generally not been observed in the Suwannee River Basin.

The SWIM Plan (SRWMD 2017) concluded that increased compliance with agricultural BMPs and the development of new BMPs is critical to holding the line on water quality in the Suwannee River Basin. More so than other areas in Florida, the natural systems in the District are closely linked to the hydrogeology of the region. Fertilizers and other agricultural chemicals can leach rapidly into the porous aquifer and degrade both ground and surface water quality. Increased nutrient inputs due to increased runoff from, for example, row crops and urbanized areas, can degrade water quality and affect

freshwater and estuarine habitats directly. Increased turbidity associated with runoff from agricultural fields can reduce water clarity and light availability, thereby reducing SAV production. Increased nutrients can also result in phytoplankton blooms that reduce the amount of light available to SAV and may out-compete native algae. For example, reduced optical water quality due to elevated phytoplankton concentrations and increased water color combined with reduced salinities, have affected SAV beds following heavy rainfall events since 2012. Local runoff from ditching and draining activities may have similar effects.

The project area is in the Gulf Coastal Lowlands in the lower Suwannee River watershed (described earlier), where the surface and groundwater are closely connected due to the karst landscape. Soils in the project area range from shallow sandy soils to muck in many wetland areas. Most of the area is less than 50 feet in elevation (the elevation at Chiefland is 40 feet). The surface of the land is low, with flat to gently dipping porous rock, continually influenced by groundwater. Springs are numerous and water empties from limestone vents closer to the Suwannee River. The project area includes three small drainage basins that drain to the Suwannee River that drain to Manatee Springs and then 24 miles downstream to the Suwannee River. The farthest extent of the springshed is at the edge of Devil's Hammock WMA, located just southeast of the City of Chiefland, in the southeast portion of the project area. Devil's Hammock drains to the upper Wacassassa River, which, like the Suwannee River, drains to the Gulf of Mexico. Stormwater runoff in the project area transports nutrient loads from primarily row crop operations, as well as sediment loads from silviculture operations, into the ground and surface waters in the three basins, to Manatee Springs and the Suwannee River.

Soils in the project area are 90 percent (67,447 acres) upland soils and are primarily (72 percent) of the Otela soil series. Otela soils are very deep, moderately well drained, moderately slowly to slowly permeable soils on broad uplands formed in sandy and loamy marine sediments over limestone on karst topography, slopes ranging from 0 to 8 percent. Less than 10 percent (6,3976 acres) of the project area includes wetland soils. Wetland soils in the project area are frequently flooded, ponded, poorly drained, and/or depressional fine sands such as Clara, Holopaw, Chobee and Placid soils complexes. A system of interconnected swamps formed by groundwater seepage occur in the headwaters of the Waccasassa River and the far southeastern portion of the project area (Vernon 1951). In and proximate to the project area, numerous small wet prairies, scrub-shrub swamps, and small open lakes occur, drained by and connected to underground sinks and swamps. Also due to the strong hydrogeologic connection, water levels fluctuate seasonally, but are maintained even during low rainfall periods by groundwater seepage from the aquifer. Long Pond (of the Long Pond and Long Slough basins) is located a mile south of Chiefland along the western margin of the Waccasassa River basin and during flood events drains along a former valley to the Suwannee River. Lakes in the project area were formed in sinkhole basins.

In the Suwannee River watershed NO_{3^-} trends continue to increase over time for most of the river and in many of the springs. Similarly, NO_{3^-} in Manatee Springs have demonstrated and increasing trend and are above 2.0 mg/l, above the TMDL limit of 0.35 mg/l.

Biological Resources

The Suwannee River Basin remains mostly rural, with relatively little urban development or intense agriculture. In summary, managed forests (silviculture) and other forested uplands account for 46 percent of the watershed, while wetlands (both forested and herbaceous) encompass 17 percent of the watershed (Table 4-38). Combined, these two land cover types constitute 64 percent of the watershed. The more intense agricultural land uses of row crops and rangeland comprise 14 and 10 percent of the basin, respectively. Urban land development makes up only 10 percent of the watershed. The largest urbanized area is east of the Suwannee River, in the Santa Fe watershed, due to its proximity to Gainesville, the University of Florida, and several other incorporated areas.

In the Suwannee River Basin natural systems include upland, freshwater, and marine/estuarine habitats. Upland or terrestrial habitats in the Basin have historically been dominated by pine flatwoods (District 1991). Natural upland habitats in the Basin include communities such as upland hardwood forest, upland pine (e.g., longleaf pine and scrubby flatwoods), upland mixed forest, mesic hammock, and sandhill and scrub communities that provide habitat for numerous wildlife species. These uplands are typically desirable for development and remaining uplands may be altered by reduced fire regimes due to urbanization, increases in non-native and invasive species, and fragmentation due to proximate development and roads. Hardwood forested uplands may be mesic or xeric, dominated primarily deciduous or deciduous/evergreen upland species such as American beech, southern magnolia, dogwood, and others. Mesic hammocks are characterized by a closed evergreen canopy of species such as live oak, southern magnolia, pignut hickory, and saw palmetto. Xeric hammocks include a closed canopy of evergreen hardwoods such as sand live oak and saw palmetto.

Freshwater habitats include riparian forests, floodplains, seepage slopes, wet prairies, and floodplain wetlands dominated by flood tolerant species such as cypress trees (*Taxodium* spp.), as well as spring systems and lakes. These wetland resources fulfill a variety of functions including fish and wildlife habitat, flood storage, runoff filtration, coastal storm surge buffering, and nursery areas for economically important species (commercial and recreational fisheries and game species). Springs and spring-run streams in the Suwannee River watershed are perennial sources of clear water from deep aquifer headwaters, often with a limestone bottom with SAV and EAV. Flooding is critical to fish access to the forested floodplain for forage and the rich organic debris is essential to the functional integrity of downriver ecosystems such as estuaries.

The tremendous freshwater flow volume from the Suwannee River supports a large estuary at the mouth of the river, including oyster reefs, SAV beds, and hard and soft bottom habitat. Estuarine and coastal habitats occur landward or upstream until soil or water salinities are less than 0.5 ppt (and are therefore considered freshwater systems). Along the Big Bend coast of Florida, SAV coverage is extensive and are often the dominant structural feature in the shallow, subtidal estuaries and nearshore, coastal waters in the region. SAV provides essential refuge and forage habitats for a myriad of ecologically and economically important fauna. Approximately 85 percent of the recreational and commercial fishery species in Florida spend some portion of their life in estuaries (Comp and Seaman 1985), and many of these species are considered obligate SAV inhabitants.

Numerous species rely on these habitats for nesting, roosting, spawning, foraging, and other uses throughout or during different stages of their lives, including federally listed species (Table 4-39). Many species use both freshwater and estuarine/marine habitats. For example, the federally threatened Gulf sturgeon lives in the Gulf and returns to natal freshwater rivers and streams to spawn; the federally threatened West Indian manatee lives and travels along the Gulf coast and seeks refuge in freshwater springs in the winter; the federally threatened American alligator (due to similarity in appearance to the federally threatened American crocodile) inhabits freshwater and estuarine waters; and the federally threatened wood stork can be found from estuarine tidal marshes to spring runs, to sandhill lakes. Other fish and wildlife species using these habitats include wading birds such as the little blue heron, tricolored heron.

Most uplands in the project area (and the watershed) have been converted to silviculture or row crops. Wetlands have also been harvested for timber, although remaining swamps contain pine, pond and bald cypress, cedar, tupelo, maple, bay, and other wetland trees. The Chiefland area is also a destination for water recreation, hunting, and fishing due to its proximity to the Suwannee River, local springs, and the Gulf. Undeveloped habitat in the project area accounts for 34 percent of project area (excluding tree plantations). Habitats include upland forests and wetlands, although wetlands account for only 6.90 percent of the project area and water (streams, lakes, springs) account for less than one percent of the project area.

Like most of the lower Suwannee River basin, the project area is dominated by agricultural land uses (32.66 percent), including crops and livestock, and tree plantations accounts for another 22.15 percent of the land cover in the projects area (Table 4-38). Urban land cover makes up another 8.98 percent of the project area. The impact of agriculture operations involving only land clearing (e.g., cattle grazing) tend to be less severe with respect to water resources than those that also involve the alteration of natural drainage patterns and groundwater levels (e.g., row crops). Agricultural land uses of poultry farms, row crops, and dairies contributed approximately 32, 28, and 20 percent respectively of the estimated nitrogen load to groundwater in that watershed. For this reason, agricultural BMPs are the primary focus of the Suwannee River Partnership (SRP, formed in 1999) activities.

Small wetlands are located in the far southeastern corner of the project area and are associated with Long Pond and Long Slough and the numerous, but small, prairie and swamp wetlands. The historic agricultural practices and conversion from upland silviculture to higher intensity row crops or animal operations has resulted in the loss of forested habitat and connectivity among habitats important to numerous species. There has also been disturbance and loss of native SAV (SAV) in springs due to excessive recreational use and/or algae proliferation due to increased nutrient concentrations; loss of fish habitat due to reduced flows and exposure of formerly inundated floodplains; loss of marsh habitat due to lowered groundwater levels as a result of water withdrawals; disturbance of habitat by invasive species such as wild hogs and subsequent invasion of nonnative and invasive plant species; and loss of salt marsh habitat due to sea level rise and inundation. Federally listed species potentially occurring in the project area, as identified through IPaC and FNAI are listed in Table 4-39 (USFWS 2018a, FNAI 2018). State and federally listed species are listed for the watershed in Appendix E.

Table 4-38 Acres of habitat in the Lower Suwannee River Watershed –Nutrient Reduction project area

FLUCCS Code	Acres	Percent of Total Area
Developed - Total	**32,762.06**	**43.89**
Agriculture	**24,381.86**	**32.66**
2110: Cropland and Pastureland, Tree Crops	22,386.08	29.99
2310: Feeding Operations	81.73	0.11
2400 - 2600: Nurseries and Vineyards, Specialty Farms, Other Open Lands	1,914.05	2.56
Barren Land	**730.52**	**0.98**
7400: Disturbed Land	730.52	0.98
Transportation, Communication and Utilities	**944.81**	**1.27**
8100- 8300: Transportation, Communications, Utilities	944.81	1.27
Urban and Built-Up	**6,704.87**	**8.98**
1100 - 1300: Residential, Low, Medium, and High Density	5,338.08	6.72
1400-1900: Commercial and Services, Industrial, Institutional, Open Land	1,366.79	9.91
Undeveloped -Total	**41,885.90**	**56.11**
Rangeland	**2,890.32**	**3.87**
3100: Herbaceous (Dry Prairie)	1,529.64	2.05
3200 - 3300: Shrub and Brushland, Mixed Rangeland	1,360.68	1.82
Upland Forests	**33,353.33**	**44.68**
4100: Upland Coniferous Forests	1,140.63	1.53
4200: Upland Hardwood Forests	15,677.79	21.00
4410: Tree Plantations	16,534.91	22.15
Wetlands	**5,152.57**	**6.90**
6100: Wetland Hardwood Forests	2,313.32	3.10
6200 - 6300: Wetland Coniferous Forests, Forested Mix	656.23	0.88
6400: Vegetated and non-vegetated Non-Forested Wetlands	2,183.03	2.92
Water	**489.68**	**0.66**
5100: Streams and Waterways	441.67	0.59
5200: Lakes, Reservoirs, Springs	48.01	0.06
Grand Total	**74,647.97**	**100.00**
Note: values may not add up due to rounding.		

Table 4-39 Threatened and Endangered Species potentially affected by the Proposed Lower Suwannee River Watershed –Nutrient Reduction

Common Name	Scientific Name	Habitat	Status	Likelihood
Striped newt	*Notophthalmus perstriatus*	Lacustrine: Shallow water, isolated ephemeral ponds in sandhill and pine flatwoods communities Palustrine: Forested	C	Potential
Eastern indigo snake	*Drymarchon corais couperi*	Terrestrial: mesic flatwoods, upland pine forest, sandhills, scrub, scrubby flatwoods, rockland hammock, ruderal	T	Potential
Gopher Tortoise	*Gopherus polyphemus*	Terrestrial: mesic flatwoods, upland pine forest, sandhills, scrub, scrubby flatwoods, rockland hammock, ruderal	C	Potential
Florida scrub jay	*Aphelocoma coerulescens*	Terrestrial: fire dominated mesic flatwoods, upland pine forest, sandhills, scrub, scrubby flatwoods, rockland hammock, ruderal	T	Potential
Red-cockaded woodpecker	*Picoides borealis*	Terrestrial: mature pine forests	E	Unlikely
Red knot	*Calidris canutus rufa*	Estuarine: bays, tidal flats, salt marshes Terrestrial: sandy beaches Marine: aerial, near shore	T	Potential
Wood stork	*Mycteria americana*	Estuarine: marshes Lacustrine: floodplain lakes, marshes (feeding), various Palustrine: marshes, swamps, various	T	Potential
Salt marsh vole	*Microtus pennsylvanicus dukecampbelli*	Terrestrial and estuarine: salt marshes and the ecotones between salt marsh and upland. Known to occur at one site along Waccasassa Bay in Levy County.	E	Unlikely
West Indian Manatee	*Trichechus manatus latirostris*	Estuarine: SAV, open water Marine: open water, SAV	E	Likely

Note: Species determined to be "Unlikely" to be found in the action area are not addressed further in this analysis. E=Endangered, T=Threatened, SAT=Similarity of Appearance (Threatened), C=Candidate, SSC=Species of Special Concern, CH=Critical Habitat.

4.11.1.3 Environmental Consequences

Section 4.6.5.3 describes the anticipated environmental consequences of the NR1, Pensacola Bay and Perdido River Watersheds - Nutrient Reduction project. While this project is located in a different geographic area, the environmental consequences of the alternative evaluated here and the Pensacola Bay and Perdido River Watersheds project described in Section 4.6.5.3 are anticipated to be substantially similar. As such, they are not repeated here.

4.12 No Action

4.12.1 Habitat Projects on Federally Managed Lands

Under the No Action alternative, the RP/EA improvements to habitat on federally managed lands would not be made and potential short-term and temporary adverse impacts to physical and biological resources associated with beach renourishment, invasive species control, and predator management would not occur. If the projects are not implemented, minor to moderate adverse impacts to habitats and species are anticipated including: disturbance to bird and turtle nesting, sea turtle hatchling

disorientation due to beach lighting, habitat trampling, trash accumulation, collisions with wildlife, and continued sand loss along Perdido Key due to reduced sand input from littoral drift. Under the No Action alternative, populations of invasive species such as hogs and raccoons that are responsible for heavy predation on species such as sea turtles and shorebirds and compete directly with native species for food and habitat would remain unchecked except for intermittent controlled hunts; there would be no comprehensive approach to addressing invasive species; sensitive habitats would remain vulnerable to trampling and other disturbances.

4.12.2 Nutrient Reduction

Under the No Action alternative, the RP/EA alternatives would not be pursued by the FL TIG at this time. Unless funded through other means, addressing the excess nutrient and sediment inputs into waters of these watersheds would not occur. This lack of action would result in short-and long-term, minor to moderate, adverse impacts on wildlife because of poor habitat quality, reduced ecosystem function, and reduced water quality. The intensity of the impact would depend on the level of development in area and corresponding increase in nonpoint source nutrients and sediments. Benefits to other resources that would also benefit from the alternative would not be realized.

4.12.3 Water Quality

Under the No Action alternative, the RP/EA alternatives would not occur. Long-term minor to moderate adverse impacts to water quality and hydrology would continue in the coastal areas covered by the projects due to: runoff of untreated and excess volumes of stormwater into aging and inadequate urban stormwater catchments; discharge of domestic wastewaters into OFWs instead of beneficial reuse; erosion and sediment loading from dirt roads that cross tributaries to OFWs and critical habitat; surface water runoff and groundwater seepage of nutrients and bacteria from aging and inadequate OSTDs into impaired waters; hydrologic fragmentation that reduces or eliminates tidal exchange and/or fish and wildlife access between floodplains, rivers and streams, and estuaries. . Habitats and fish and wildlife would not be disturbed or eliminated by short-term impacts of construction activities necessary to install and/or replace stormwater infrastructure, road stabilization and paving, water reuse pipelines along existing roads, replace OSTDSs with municipal sewer service, and remove impediments to hydrology in streams and floodplains, low water crossing structures, ditch blocks, or other hydrologic restoration activities.

Without the projects or projects similar in scope and size, designated water quality impairments (e.g., nutrients and sediments) would not be addressed, resulting in continued long-term adverse impacts to physical, biological, and recreational resources. In addition, hydrologic fragmentation would continue to adversely impact fish and wildlife by reducing the connection between estuaries, rivers, streams, and wetlands, precluding fish access into floodplains, reducing available habitat for wading birds and other wetland dependent species, and providing continued opportunities for further establishment and spread of invasive and exotic species, which would continue to adversely impact habitat and resources of native species.

4.12.4 Provide and Enhance Recreational Opportunities

Under the No Action alternative, the RP/EA alternatives would not occur, and new or enhanced recreational access or recreational opportunities would not be provided. Water quality and hydrology would remain as they are in the project area. Natural communities would not be disturbed or eliminated by construction of new or enhanced recreational access and amenities or replaced by the amenities (e.g., expanded parking area, access road to beach, beach use parking area, picnic pavilions, tent campsites, composting restroom, and kayak launch).

4.13 NEPA Cumulative Impacts Analysis

The CEQ regulations for implementing NEPA require the assessment of cumulative impacts in the decision-making process. Section 6.6 and Appendix 6.B of the PDARP/PEIS are incorporated by reference into the cumulative impacts analysis, including the methodologies for assessing cumulative impacts, identification of affected resources, and the cumulative impacts scenario. The PDARP/PEIS found that implementation of restoration projects under the Habitat Projects on Federally Managed Lands, Nutrient Reduction, Water Quality, and Provide and Enhance Recreational Opportunities Restoration Types would be consistent with its Restoration Goals and would not be expected to contribute substantially to short-term or long-term, adverse cumulative impacts on physical, biological, or socioeconomic resources when analyzed in combination with other past, present, and reasonably foreseeable future actions.

Sections 4.3 to 4.12 of this chapter analyze the environmental consequences analysis for each of the alternatives evaluated in this RP/EA. The alternatives evaluated in this RP/EA are designed to improve environmental quality or to increase access and enjoyment of natural resources. Adverse effects would not be anticipated to extend beyond the construction period for a number of projects. Some resource areas would be affected over the long term, some beneficially and some adversely. However, none of the projects included in this RP/EA would result in any long-term adverse effects that rise above a moderate adverse effect. In fact, for many of the resources, projects are anticipated to result in no long-term adverse effects and long-term benefits. As such, the FL TIG concluded that although some of the projects may have an incremental contribution to adverse cumulative impacts, the contribution would not be substantial over the long-term. Many of the alternatives have the potential to provide long-term beneficial cumulative impacts to physical, biological, and socioeconomic resources.

The environmental consequences analyses found that RP/EA projects would have no effects or would have short-term minor adverse effects on several resources. Resources for which only minor adverse effects are anticipated are included in this cumulative impacts analysis to appropriately narrow the scope of the environmental analysis to the issues that would have an influence on the decision-making process or deserve attention from an environmental perspective (CEQ 1997).

The PDARP/PEIS section Appendix 6.B, Additional Actions for Consideration in Cumulative Impacts Analysis, describes many of the federal, state, and local actions or and programs related to water quality or watershed habitat improvement that have occurred in the past and present and are expected to

continue into the future. Further, the Phase III RP/PEIS evaluated projects identified past, present, and reasonably foreseeable future actions and impacts in Florida.

The geographic areas covered in the Phase III ERP/PEIS cumulative analysis include Pensacola Bay, Santa Rosa Sound/Choctawhatchee Bay, Walton County, St. Andrew Bay, St. Joseph Bay, Apalachicola Bay, Apalachicola and Apalachee Bays, and offshore waters of Florida. These Phase III ERP/PEIS geographic areas overlap the vast majority of the areas in which projects in this RP/EA would occur.[8] The Phase III ERP/PEIS cumulative impacts analysis is incorporated by reference herein and the cumulative impacts analysis is summarized below.

4.13.1 Physical Resources

The condition of ecosystems in RP/EA project areas reflect water quality impacts from urban development, industry, transportation, agricultural runoff, atmospheric deposition, and other sources throughout the area. A number of other environmental stewardship projects are also planned in proximity to RP/EA projects. If alternatives in this plan are carried out in conjunction with other environmental stewardship and restoration efforts, there is the potential for synergistic effects with these activities. When RP/EA projects are analyzed in combination with other past, present, and reasonably foreseeable future actions, short and long-term cumulative adverse impacts to hydrology and water resources (water quality) would likely occur. However, RP/EA projects would not contribute substantially to cumulative adverse impacts. RP/EA projects, carried out in conjunction with other restoration efforts have the potential to result in some long-term beneficial cumulative impacts to physical resources.

4.13.2 Biological Resources

Ongoing coastal and urban development, marine transportation, as well as military activities have adversely affected wildlife and habitats through human related disturbances including loss of habitats to developed areas, introduction of invasive species and habitat fragmentation in project areas. As noted above, a number of other environmental stewardship projects are also planned in proximity to RP/EA projects. If alternatives in this plan are carried out in conjunction with other environmental stewardship and restoration efforts, there is the potential for synergistic effects with these activities. When RP/EA projects are analyzed in combination with other past, present, and reasonably foreseeable future actions, short and long-term cumulative adverse impacts to biological resources would likely occur. However, RP/EA projects would not contribute substantially to cumulative adverse impacts. RP/EA projects, carried out in conjunction with other restoration efforts have the potential to result in some long-term beneficial cumulative impacts to biological resources.

[8] Three alternatives in this RP/EA are located in Suwannee River Watershed and Charlotte Harbor, which were not explicitly discussed in the Phase III ERP/PEIS (available at: http://www.gulfspillrestoration.noaa.gov/restoration/early-restoration/phase-iii). However, two of the three alternatives in areas not included in the Phase III ERP/PEIS are P&D projects and would not be expected to contribute to cumulative impacts in the area.

4.13.3 Socioeconomic Resources

The tourism industry in the region offers a wide variety of activities such as boating, ecotourism (wildlife watching, birding, visiting parks, wildlife refuges, and scenic viewing), hunting, and fishing in RP/EA project areas. As noted above, a number of other environmental stewardship projects are also planned in proximity to RP/EA projects. If alternatives in this plan are carried out in conjunction with other environmental stewardship and restoration efforts, there is the potential for synergistic effects with these activities. When RP/EA projects are analyzed in combination with other past, present, and reasonably foreseeable future actions, short-term adverse impacts as well as long-term beneficial cumulative adverse impacts to resources would likely occur. However, RP/EA projects would not contribute substantially to cumulative adverse impacts. RP/EA projects, carried out in conjunction with other restoration efforts have the potential to result in some long-term beneficial cumulative impacts to socioeconomic resources.

4.14 Comparison of Alternatives

The environmental analysis demonstrated that there would be primarily minor, but also some moderate short-term and long-term adverse impacts as well as environmental benefits from implementation of the RP/EA alternatives. The No Action alternative is anticipated to result in short-term and long-term minor to moderate adverse impacts. A summary of impacts for each restoration alternative and the No Action alternative is provided in Table 4-40.

As addressed in the PDARP/PEIS, alternatives which only include P&D activities would cause short-term, minor adverse impacts through associated fieldwork. These impacts would be very minor and localized to the project site. Adverse impacts to the biological and physical environment also could include short-term disturbance of habitats and species, minor emissions from vehicles, and minor disturbance to terrestrial, estuarine, and marine environments. Implementing Trustees would conduct due diligence to ensure that no unanticipated effects to listed species and habitats would occur. Adverse impacts would be minimized by following mitigation measures, BMPs, and other guidance developed during the permitting process, environmental reviews, consultation process, and other relevant regulatory requirements. The FL TIG would also consider best practices referenced in Section 6.15 and Appendix 6.A of the PDARP/PEIS.

Table 4-40 Summary of the Direct and Indirect Impacts of the Reasonable Range Restoration Alternatives

Restoration Alternative	Geology and Substrates	Hydrology and Water Quality	Air Quality	Noise	Habitats	Wildlife Species	Marine and Estuarine Fauna	Protected Species	Socioeconomics and Environmental Justice	Cultural Resources	Infrastructure	Land and Marine Management	Tourism and Recreational Use	Fisheries and Aquaculture	Marine Transportation	Aesthetics and Visual Resources	Public Health and Safety
No Action	L	L	NE	NE	l	l	l	l	NE	NE	l	l	l	NE	NE	NE	L
FM1	s	s	s	NE	s+	s+	NE	s	+	NE	NE	NE	s+	NE	NE	NE	NE
FM2	NE	NE	NE	NE	NE	NE	NE	NE	+	NE	NE	NE	NE	NE	NE	NE	NE
FM3	NE	NE	NE	NE	+	+	+	+	+	NE	NE	NE	NE	NE	NE	+	NE
FM4	s+	NE	NE	NE	s+	+	NE	s+	+	NE	s+	NE	s+	NE	NE	s+	+
FM5	s	s	NE	NE	s+	s+	s+	s+	+	NE	s+	NE	s+	NE	NE	s+	NE
FM6	NE	NE	s	s	s+	s+	NE	+	+	NE	+	NE	+	NE	NE	NE	NE
NR1	sl+	sl+	NE	NE	s+	s+	+	s+	+	NE	NE	NE	NE	NE	NE	NE	NE
NR2	sl+	sl+	NE	NE	s+	s+	+	s+	+	NE	NE	NE	NE	NE	NE	NE	NE
NR3	sl+	sl+	NE	NE	s+	s+	+	s+	+	NE	NE	NE	NE	NE	NE	NE	NE
REC1	sl+	sl+	s	l	sl	sl	sl	sl	s+	NE	s+	NE	s+	NE	NE	s	L
REC2	Sl	SL	s	l	Sl	Sl	Sl	sl	s+	NE	s+	NE	s+	NE	NE	s	NE
REC3	sl	sl	s	l	sl	sl	sl	sl	s+	NE	s+	NE	s+	NE	NE	s	+
REC4	sl	sl	s	l	sl	sl	sl	sl	s+	NE	sl+	NE	s+	NE	NE	S	NE
REC5	sl+	sl+	s	l	sl+	sl+	sl	sl+	s+	NE	s+	NE	s+	NE	NE	s	NE
REC6	sl+	sl+	s	l	SL+	SL+	SL+	SL+	s+	NE	s	NE	s+	NE	NE	s	NE
REC7	sl	sl	s	l	sl	sl	sl	sl	s+	NE	s	NE	s+	NE	NE	s	+
REC8	sl	sl	s	l	sl	sl	sl	sl	s+	NE	s	NE	s+	NE	NE	s	NE
REC9	sl+	sl+	s	l	sl+	sl	sl	sl	s+	NE	s	NE	s+	NE	NE	s	+
REC10	sl	sl	s	l	sl	sl	sl	sl	s+	NE	s	NE	s+	NE	NE	s	+

Restoration Alternative	Geology and Substrates	Hydrology and Water Quality	Air Quality	Noise	Habitats	Wildlife Species	Marine and Estuarine Fauna	Protected Species	Socioeconomics and Environmental Justice	Cultural Resources	Infrastructure	Land and Marine Management	Tourism and Recreational Use	Fisheries and Aquaculture	Marine Transportation	Aesthetics and Visual Resources	Public Health and Safety
REC11	sl	sl	s	l	sl	sl	sl	sl	s+	NE	s	NE	s+	NE	NE	s	+
WQ1	s+	s+	s	s	s+	s+	NE	s+	s+	NE	NE	NE	s+	NE	NE	s	s
WQ2	s	+	s	s	s+	s	+	s	NE	NE	S	s	S	NE	**S**	s	+
WQ3	s+	s+	s	s	s+	s+	NE	s+	NE	NE	s+	s	NE	NE	s+	NE	+
WQ4	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE
WQ5	s	s+	s	s	+	s+	+	s+	NE	NE	S+	s+	s	NE	**S**	s	s
WQ6	l	+	s	s	s	s	+	s	+	NE	S+	s	s	NE	S	s	+
WQ7	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE
WQ8	s	+	s	s	s+	s+	+	s+	+	NE	s+	s	NE	NE	s	s	+
WQ9	s+	s+	s	s	s+	s+	+	s+	NE	NE	+	+	+	NE	+	NE	NE
WQ10	s	+	s	s	s	s	+	s	+	NE	s	s	NE	NE	+	s	+
WQ11	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE
WQ12	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE

Key:

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

4.15 Compliance with Environmental Laws and Regulations

The Florida TIG would ensure compliance with all applicable state and local laws and other applicable federal laws and regulations relevant to the proposed restoration alternatives. The Florida TIG has started coordination and reviews for protected species and their habitats under the ESA, Magnuson-Stevens Act, MMPA, cultural resources under the NHPA, permits under Section 404 of the CWA and Section 10 of the Rivers and Harbors Act, consistency with the Coastal Zone Management Act for the preferred alternatives, and other federal statutes, where appropriate.

Projects involving in-water work would require a Section 404 permit, pursuant to the Clean Water Act (CWA). Any work in waters of the U.S., including wetlands, associated with this alternative would be coordinated with the USACE pursuant to Section 404 of the CWA. Coordination with USACE and final authorization pursuant to CWA and Rivers and Harbors Act (RHA) would be completed prior to final design and construction. USACE and NMFS construction guidelines would be followed, where possible, regarding pier construction (USACE and NMFS 2001).

Wherever pre-existing consultations or permits are present, they will be reviewed to determine if the consultations/permits are still valid or if a re-initiation of the consultations is necessary. Implementing Trustees are required to implement alternative-specific mitigation measures (including BMPs) identified in the RP/EA and completed consultations/permits. Oversight, provided by the Implementing Trustees, would conduct due diligence with regard to ensuring no unanticipated effects to listed species and habitats occur, including ensuring that BMPs are implemented and continue to function as intended. As noted above, pursuant to the Coastal Zone Management Act of 1972, federal activities must be consistent to the maximum extent practicable with the federally approved coastal management programs for states where the activities would affect a coastal use or resource. Federal Trustees are submitting consistency determinations for state review coincident with public review of this document.

Federal environmental compliance responsibilities and procedures would follow the Trustee SOPs, which are laid out in Section 9.4.6 of that document. Following these SOPs, the Implementing Trustees for each alternative would ensure that the status of environmental compliance (e.g., completed versus in progress) is tracked through the Restoration Portal. The Implementing Trustees would keep a record of compliance documents (e.g., ESA letters, permits) and ensure that they are submitted for inclusion in the Administrative Record. Additional information specific to each preferred alternative regarding the environmental compliance requirements and their status are provided in the project-specific descriptions earlier in this chapter. Status of environmental compliance by statute and project will be provided in the Final RP/EA.

4.15.1 Additional Laws

Examples of applicable laws or Executive Orders include, but are not necessarily limited to, those listed below. Additional detail on each of these laws or Executive Orders can be found in the PDARP/PEIS (Chapter 6).

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

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

- Endangered Species Act (16 U.S.C. §§1531 *et seq.*)
- Magnuson-Stevens Fishery Conservation and Management Act (16 U.S.C. §§1801 *et seq.*)
- Marine Mammal Protection Act (16 U.S.C. §§1361 *et seq.*)
- Coastal Zone Management Act (16 U.S.C. §§1451 *et seq.*)
- National Historic Preservation Act (16 U.S.C. §§470 *et seq.*)
- Coastal Barrier Resources Act (16 U.S.C. §§3501 *et seq.*)
- Migratory Bird Treaty Act (16 U.S.C. §§703 *et seq.*)
- Bald and Golden Eagle Protection Act (16 U.S.C. §§668 *et seq.*)
- Clean Air Act (42 U.S.C. §§7401 *et seq.*)
- Federal Water Pollution Control Act (CWA, 33 U.S.C. §§1251 et seq.) and/or Rivers and Harbors Act (33 U.S.C. §§401 et seq.)
- Marine Protection, Research and Sanctuaries Act
- Estuary Protection Act
- Archaeological Resource Protection Act
- National Marine Sanctuaries Act
- Farmland Protection Policy Act
- Executive Order 11990: Protection of Wetlands
- Executive Order 12898: Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations
- Executive Order 12962: Recreational Fisheries as amended by Executive Order 13474, September 26, 2008).
- Executive Order 13112: Safeguarding the Nation from the Impacts of Invasive Species (as amended by Executive Order 13751, Dec. 5, 2016).
- Executive Order 13175: Consultation and Coordination with Indian Tribal Governments
- Executive Order 13186: Responsibilities of Federal Agencies to Protect Migratory Birds

Chapter 5 Monitoring and Adaptive Management

Monitoring, Adaptive Management, and Administrative Oversight is one of the Restoration Goals in the PDARP/PEIS. As described in Chapter 5, Appendix E of the PDARP/PEIS, the Trustee Council is committed to a MAM framework to support restoration activities by incorporating 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 natural resources and their services injured by the DWH oil spill. The MAM framework also satisfies the OPA NRDA regulation provisions for monitoring, which include establishing restoration objectives that are specific to the natural resource injuries (15 C.F.R. § 990.55(b)(2)). Objectives should clearly specify the desired project outcome, and the performance criteria by which successful restoration under the OPA NRDA regulations will be determined (15 C.F.R. § 990.55(b)(2)). The OPA NRDA regulatory provisions for the monitoring component of a restoration plan are further described in 15 C.F.R. § 990.55(b)(3).

Project-level MAM is an important component of the overall MAM framework. The FL TIG has prepared draft project-level MAM plans, included in Appendix A. These MAM plans are consistent with the requirements and guidelines set forth in the PDARP/PEIS and the Trustee SOPs, as well as the Trustees MAM Procedures and Guidelines Manual Version 1.0 (DWH NRDA Trustees 2017). MAM plans are only developed for alternatives that the FL TIG identified as preferred (Chapter 2, Table 2-2). A MAM plan would be developed for the other alternatives if later selected for implementation as part of future restoration planning activities. In addition, consistent with Section 10 of the Trustee SOPs (revised November 15, 2016), a MAM plan is not required for P&D projects; however one would be developed in the future if restoration actions subsequently are selected for implementation in a future restoration plan. MAM plans are living documents and will be updated as needed to reflect changing conditions and/or new information. Any significant future revisions to MAM plans will be made publicly available on the DWH Trustee website.

The purpose of a MAM plan is to identify and document the monitoring activities that would be used to help the FL TIG evaluate progress towards meeting project-specific objectives and to support any necessary adaptive management of the restoration project. Where applicable, the MAM plan identifies key sources of uncertainty and incorporates monitoring data and decision points that address these uncertainties. It also establishes a decision-making process for adjustments as needed. Monitoring will provide the basis for annual project reporting that keeps the public fully informed about project progress. Project-specific monitoring increases the likelihood of successful project implementation through the identification of potential corrective actions that could be undertaken if a project does not proceed as expected. Information collected during monitoring, and the subsequent evaluation, will also

help the FL TIG document lessons learned and how issues were addressed to provide insights for future restoration efforts.

Each of the sections included in the MAM plans are described below.

5.1 Introduction

This section provides an introduction to the MAM plan; a brief overview of the restoration project including the associated Restoration Goal, Type, Approach and Technique from the PDARP/PEIS; the project-specific restoration objectives; potential sources of uncertainty; and a description of the conceptual model associated with the project if applicable.

The FL TIG aims to propose and select projects that are feasible and have a high probability of success. In some instances, projects may employ Restoration Techniques or project components that are more innovative which may result in a higher degree of uncertainty. Sources of uncertainty, and the degree or level of uncertainty associated with projects will vary. Potential uncertainties are defined as those that may affect the ability to achieve project restoration objective(s). Monitoring can be used to inform these uncertainties and inform the selection of appropriate corrective actions in the event a project is not meeting its performance criteria.

5.2 Adaptive Management

Where appropriate for the specific project, the MAM plan includes a description of potential adaptive management actions. 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). Some projects may be well understood and not have uncertainties which warrant adaptive management. The MAM framework may be more robust for elements of the restoration plan with high degrees of uncertainty or where numerous restoration projects are planned within a given geographic area and/or for the benefit of a particular resource (Appendix 5.E.1 of the PDARP/PEIS).

5.3 Project Monitoring, Performance Criteria, and Potential Corrective Actions

This section provides a description of the project monitoring activities. This includes documentation of each monitoring parameter that would be collected, including the purpose of the parameter (e.g., monitor progress toward meeting one or more of the restoration objectives, regulatory compliance, support adaptive management of the project), method, frequency and duration of data collection, sample size, sample sites, performance criteria, and potential corrective actions that could be taken if the performance criteria are not met.

Under the OPA NRDA regulations, restoration projects should clearly identify performance criteria that would be used to determine project success or the need for corrective action (15 C.F.R. 990.55(b)(1)(vii)). A project may not be achieving its intended objectives because of previously identified

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. The decision of whether 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) to understand why project performance deviates from the predicted or anticipated outcome. Corrective action(s) may not be taken in all cases based on such considerations. The knowledge gained from this process could also inform future restoration decisions, such as the selection, design, and implementation of future similar projects.

5.4 Monitoring Schedule

In this section, a schedule for the monitoring activities is provided. Pre-execution monitoring, if applicable for the project, occurs prior to project execution. Execution monitoring occurs during project implementation and/or when a project has been fully executed as planned, although this timeframe may vary for different parameters. Performance monitoring occurs in the years following initial project execution.

5.5 Evaluation

Evaluation of monitoring data is needed to assess the performance of the project in meeting its restoration objectives, resolve 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 would be compiled and assessed at the Restoration Type and TIG level, and the results would 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 evaluation may include modeling, analysis, and interpretation of results and estimates of certainty (e.g., Type I or Type II errors) where appropriate.

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Appendix A. List of Preparers, Reviewers, and Repositories

A.1 List of Preparers and Reviewers

Agency/Firm	Name	Position
State of Florida		
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Florida Department of Environmental Protection	Phil Coram	Program Administrator, DWH Program
Florida Department of Environmental Protection	James Reynolds	Environmental Consultant, DWH Program
Florida Department of Environmental Protection	Lisa Robertson	Environmental Administrator, DWH Program
Florida Fish and Wildlife Conservation Commission	Gareth Leonard	Gulf Restoration Coordinator
Florida Fish and Wildlife Conservation Commission	Gil McRae	Director, FWRI
Florida Fish and Wildlife Conservation Commission	Amy Raker	Assistant Gulf Restoration Coordinator
Florida Fish and Wildlife Conservation Commission	Quilla Miralia	Assistant General Counsel
NOAA		
National Oceanic and Atmospheric Administration/ ERT, Inc.	Stella Wilskon	Marine Habitat Restoration Specialist
National Oceanic and Atmospheric Administration	Ramona Schreiber	Marine Habitat Resource Specialist
National Oceanic and Atmospheric Administration	Laurie Rounds	Marine Habitat Resource Specialist
National Oceanic and Atmospheric Administration	Christina Fellas	Marine Habitat Resource Specialist
National Oceanic and Atmospheric Administration	Chauncey Kelly	NOAA Office of the General Counsel
U.S. Department of the Interior		
U.S. Department of the Interior	Robin Renn	DOI DWH NEPA Coordinator
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U.S. Department of the Interior	Ben Frater	DOI DWH Assistant Restoration Manager
U.S. Department of the Interior	Erin Chandler	Fish and Wildlife Biologist
U.S. Department of the Interior	Kevin Chapman	DOI NHPA Consultation and Permits Coordinator
U.S. Department of the Interior	Lisa Stevens	Attorney-Advisor
U.S. Department of the Interior	Sarah Shattuck	Attorney-Advisor
U.S. Department of the Interior	Nanciann Regalado	DOI DWH Public Affairs and Outreach Coordinator
Industrial Economics, Incorporated	Leslie Genova	Principal
Industrial Economics, Incorporated	Nadia Martin	Senior Associate
Industrial Economics, Incorporated	Heather Ballestero	Associate
Research Planning, Incorporated	Pam Latham	Senior Scientist
Research Planning, Incorporated	Hal Fravel	Scientist
U.S. Department of Agriculture		
U.S. Department of Agriculture	Ron Howard	Senior Technical Advisor
U.S. Department of Agriculture	Mark Defley	Biologist, NRCS Gulf Coast Ecosystem Restoration Team
U.S. Department of Agriculture	Benjamin Battle	FL TIG Member

Agency/Firm	Name	Position
U.S. Environmental Protection Agency		
U.S. Environmental Protection Agency	Amy Newbold	FL TIG Member
U.S. Environmental Protection Agency	Gale Bonnano	Senior Policy Advisor
U.S. Environmental Protection Agency	Jim Bove	Attorney-Advisor
U.S. Environmental Protection Agency	Natalie Stephenson	Attorney-Advisor
U.S. Environmental Protection Agency	Megan Barnhart	NEPA Program Office
U.S. Environmental Protection Agency	Dan Holliman	NEPA Program Office
U.S. Environmental Protection Agency	Chris Parker	Environmental Scientist

A.2 List of Repositories

State	Library	Address	City	Zip
FL	Wakulla County Library	4330 Crawfordville Hwy	Crawfordville	32327
FL	Franklin County Public Library	29 Island Dr.	East Point	32328
FL	Okaloosa County Library	185 Miracle Strip Pkwy, SE	Fort Walton Beach	32548
FL	Santa Rosa County Clerk of Court, County Courthouse	5841 Gulf Breeze Pkwy	Gulf Breeze	32561
FL	Panama City Beach Public Library	125000 Hutchison Blvd	Panama City Beach	32407
FL	Escambia Southwest Branch Library	12248 Gulf Beach Hwy	Pensacola	32507
FL	Walton County Library, Coastal Branch	437 Greenway Trail	Santa Rosa Beach	32459
FL	Gulf County Public Library, Port St. Joe Branch	110 Library Drive	Port St. Joe	32456
FL	Levy County Public Library	612 E. Hathaway Ave.	Bronson	32621
FL	Charlotte Mid-County Regional Library	2050 Forrest Nelson Blvd.	Port Charlotte	33952

Appendix B. Monitoring and Adaptive Management Plans

MAM plans for each of the alternatives identified as a preferred, by the FL TIG at this time, are provided below.

Monitoring and Adaptive Management Plan for *Deepwater Horizon* NRDA Project:

FM4, Gulf Islands National Seashore (Florida) Beach and Dune Habitat Protection

Prepared by: Nadia Martin (IEc) and DOI; Draft Version Date: 8/5/2018

1 Introduction

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. Where applicable, it identifies key sources of uncertainty and incorporates monitoring data and decision points that address these uncertainties. As not all projects will have the same sources and degree of uncertainty, this project-specific MAM plan is scaled according to level of uncertainty, scope, scale, and restoration type associated with this project.

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

1.1 Project Overview

This project is being implemented as restoration for the DWH oil spill NRDA, consistent with the PDARP/PEIS.

- Programmatic Goal: Restore and Conserve Habitat
- Restoration Type: Habitat Projects on Federally Managed Lands
- Restoration Approach: Restore and enhance dunes and beaches
- Restoration Technique: Protect dune systems through the use of access control
- TIG: FL TIG
- Restoration Plan: Restoration Plan #1

This restoration project is being implemented within the Gulf Islands National Seashore (GUIS), Florida district, Perdido Key, Fort Pickens, and Santa Rosa areas. This project includes restoration actions to protect beach habitat at GUIS and associated wildlife from three threats: 1) human impacts on beaches, 2) predators, and 3) vehicle collisions on paved roads. In particular, the project includes measures to protect sensitive areas with symbolic fencing, educate visitors, control vehicle speeding, and monitoring activities. This project would directly benefit beaches and dune habitat for birds, beach mice, and sea turtles.

The implementing agency is the DOI, in coordination with the National Park Service (NPS) and GUIS staff. Other project partners include the U.S. Department of Agriculture, and a combination of University of Florida (UF), Florida Fish and Wildlife Conservation Commission (FWC), U.S. Fish and Wildlife Service (USFWS), and Audubon.

1.2 Restoration Type Goals and Project Restoration Objectives

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

- Restore federally managed habitats that were affected by the oil spill and response actions through an integrated portfolio of restoration approaches across a variety of habitats.
- Restore for injuries to federally managed lands by targeting restoration on federal lands where the injuries occurred, while considering approaches that provide resiliency and sustainability.
- Ensure consistency with land management plans for each designated federal land and its purpose by identifying actions that account for the ecological needs of these habitats.

The project restoration objectives are:

- Protect beach and dune habitat at GUIS from impacts of humans;
- Reduce vehicle collisions with wildlife at GUIS;
- Reduce impacts of predators on wildlife at GUIS.

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

1.3 Potential Sources of Uncertainty

Potential uncertainties that may affect the success of this project are described below.

Table 1.3-1 Potential Uncertainties

Uncertainty	Summary of Resolution Strategy
Reductions in human impacts and predator impacts do not occur after restoration activities are conducted.	Conduct targeted monitoring on habitat and wildlife metrics. Monitoring data would be used to refine future management actions.

1.4 Conceptual Model, Anticipated Outcomes and Future Activities

The conceptual model, described below, forms the basis of this monitoring plan, and includes a summary of the project activities, the expected product or output of those activities and the desired project outcomes. The proposed restoration activities will provide benefits to habitats and natural resources at GUIS by addressing known causes of habitat degradation and mortality and/or protection of threatened and endangered species.

Table 1.4-1 Conceptual Model

Activity	Output	Short-term outcome	Long-term outcome
Symbolic fencing or establishment of wildlife viewing areas	• Deter human trampling and reduce disturbance.	• Reduction in trampling and disturbance.	• Protection and conservation of native habitat and wildlife.
Public outreach materials	• Educate visitors.	• Reduction in human disturbance.	• Protection and conservation of native habitat and wildlife.
Law enforcement patrols	• Control vehicle speeding.	• Reduction in vehicle collisions with birds and other wildlife.	• Protection and conservation of native habitat and wildlife.
Predator management (e.g. perch deterrents, nest enclosures, and lethal control)	• Deter and remove predators.	• Reduction in mortality of shorebirds, beach mice and sea turtles, etc.	• Protection and conservation of native habitat and wildlife.

2 Adaptive Management

As noted above, there is some uncertainty related to whether reductions in human impacts and predator impacts will occur after project implementation. To adaptively manage this project, and increase the likelihood of achieving the project objective, the DOI project personnel would conduct targeted monitoring and use the monitoring data to refine future management actions.

3 Project Monitoring, Performance Criteria, and Potential Corrective Actions

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

Information on each monitoring parameter is provided below, organized by objective (Table 3-1). Note that Table 3-1 does not include all possible options for corrective actions; 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.

Table 3-1 Monitoring Parameters

Objectives	Parameter	Purpose	Method	Timing, Frequency, Duration	Sample Size and Sites	Performance Criteria	Potential Corrective Action(s)
1: Protect beach and dune habitat at GUIS from impacts of humans.	Symbolic fencing	Monitor progress toward meeting the restoration objective.	Record # acres fenced; Visual observations of fencing to check condition and functionality.	Monthly for the duration of the project.	All fenced areas in the GUIS project area.	No human encroachment into fenced areas; all shorebird nests fenced.	Reevaluate efficacy of treatment methods to advise future efforts (e.g. add additional fencing and signage).
2: Reduce vehicle collisions with wildlife at GUIS.	Vehicle collisions with birds and other wildlife; speeding on park roads	Monitor progress toward meeting the restoration objective.	Number, species, and GPS location of vehicle collisions; speed warnings or tickets issued.	Timing/frequency/ duration that roads are surveyed for collisions/roadkill and that speeding enforcement activities occur.	All roads through the GUIS project area.	No vehicle collisions with wildlife in project area.	N/A.
3: Reduce impacts of predators on wildlife at GUIS.	Prevalence of predators	Monitor progress toward meeting the restoration objective.	Visual observations of predators (including photos, tracks, scat, etc.) and depredated bird and turtle nests.	Areas and photo traps checked mornings, approximately biweekly, during nesting season for 3-year duration of project.	GUIS project area, esp. in and around fenced areas.	Annual decreases in prevalence of predators over course of project.	Reevaluate methods and results to advise future efforts.

4 Monitoring Schedule

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

Table 4-1. Monitoring Schedule

Monitoring Parameters	Year 1	Year 2	Year 3
Symbolic fencing	x	x	X
Vehicle collisions	x	x	X
Evidence of predators	x	x	X

5 Evaluation

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

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

6 Data Management

6.1 Data Description

Data collection will be compiled within 12 months after collection. To the extent practicable, all environmental and biological data generated during monitoring activities will be documented using standardized field datasheets. If standardized datasheets are unavailable or not readily amendable to record project-specific data, then project-specific datasheets will be drafted prior to conducting any project monitoring activities. Original hardcopy datasheets and notebooks and photographs will be retained by the Implementing Trustee.

Relevant project data that are handwritten on hardcopy datasheets or notebooks will be transcribed (entered) into standard digital format. All field datasheets and notebook entries will be scanned to PDF files. Electronic data files should be named with the date on which the file was created and should include a ReadMe file that describes when the file was created and by whom, and any explanatory notes on the file contents. If a data file is revised, a new copy should be made and the original preserved.

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

6.2 Data Review and Clearance

Relevant project data that are handwritten on hardcopy datasheets or notebooks will be transcribed (entered) into standard digital format. After transcription of the data, the electronic data sheets will be verified 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 are: i) entered or converted into agreed upon/commonly used digital format; ii) labeled with metadata following FGDC/ISO standards to the extent practicable and in accordance with Implementing Trustee agency requirements.

After 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 (as described below). Before submitting the monitoring data and information package, co-Implementing Trustees shall confirm with one another that the package is approved for submission.

6.3 Data Storage and Accessibility

Once all data has been QA/QC'ed it will be submitted to the Restoration Portal. Trustees will provide DWH NRDA MAM data and information to the Restoration Portal as soon as possible and no more than one year from when data are collected.

6.4 Data Sharing

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

7 Reporting

All reporting would occur after field surveys are complete for each season annually. This report would 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 would be completed that includes:

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

8 Roles and Responsibilities

Data will be reviewed and submitted to the Restoration Portal by DOI USFWS project personnel.

Monitoring and Adaptive Management Plan for Deepwater Horizon NRDA Project:

FM5, Gulf Islands National Seashore (Florida) Invasive Plant Removal

Prepared by: Nadia Martin (IEc) and DOI; Draft Version Date: 8/5/2018

1 Introduction

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. Where applicable, it identifies key sources of uncertainty and incorporates monitoring data and decision points that address these uncertainties. As not all projects will have the same sources and degree of uncertainty, this project-specific MAM plan is scaled according to level of uncertainty, scope, scale, and restoration type associated with this project.

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

1.1 Project Overview

This project is being implemented as restoration for the DWH oil spill NRDA, consistent with the PDARP/PEIS.

- Programmatic Goal: Restore and Conserve Habitat Restoration
- Restoration Type: Habitat Projects on Federally Managed Lands
- Restoration Approach: Protect and conserve marine, coastal, estuarine, and riparian habitats
- Restoration Technique: Develop and implement management actions in conservation areas and/or restoration projects
- TIG: FL TIG
- Restoration Plan: Restoration Plan #1

This restoration project is being implemented within Gulf Islands National Seashore (GUIS), Florida district, in Escambia County. This project includes activities to treat five of the most problematic invasive species in the Fort Pickens, Santa Rosa, and Perdido Key areas of GUIS more comprehensively than they are currently and to collect information on the invasive species to protect and conserve habitat and wildlife resources in the area. This project would remove invasive species from natural areas at GUIS and gradually restore the coastal habitats as the unnatural pressure from the invasive species is reduced or removed and native species are able to thrive. This in turn would likely allow native animal populations that depend on these coastal habitats to improve.

The implementing agency is the DOI. The partner agencies include NPS and GUIS staff, NPS Southeast Regional office, FDEP, Escambia County Extension Office, Gulf Coast Plain Ecosystem Partnership, and UF.

1.2 Restoration Type Goals and Project Restoration Objectives

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

- Restore federally managed habitats that were affected by the oil spill and response actions through an integrated portfolio of restoration approaches across a variety of habitats.
- Restore for injuries to federally managed lands by targeting restoration on federal lands where the injuries occurred, while considering approaches that provide resiliency and sustainability.
- Ensure consistency with land management plans for each designated federal land and its purpose by identifying actions that account for the ecological needs of these habitats.

The project restoration objective is:

- Reduce the occurrence of invasive plant species (including cogon grass (*Imperata cylindrical*), torpedo grass (*Panicum repens*), popcorn trees/Chinese tallow (*Sapium sebiterum*), Cuban bulrush (*Oxycaryum cubense*), and beach vitex (*Vitex rotundifolia*)) at GUIS through treatment methods.

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

1.3 Potential Sources of Uncertainty

Potential uncertainties that may affect the success of this project are described below.

Table 1.3-1 Potential Uncertainties

Uncertainty	Summary of Resolution Strategy
Reductions in invasive plants do not occur after mapping and treatment of plants.	Conduct evaluation of current treatment methods and compare to past methods, research new methods, and adjust Treatment Action Plan, as necessary.

2 Adaptive Management

As noted above, a potential uncertainty for this project is whether the invasive plant treatment methods will be successful in reducing the occurrence of invasive plants at GUIS. To adaptively manage this project, and increase the likelihood of achieving the project objective, the DOI project personnel would evaluate the progress throughout the project. This would include evaluating the area and percent cover of the invasive plants over time and comparing to pre-project conditions and use the monitoring data collected to refine future management actions, as necessary.

3 Project Monitoring, Performance Criteria, and Potential Corrective Actions

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

Information on each monitoring parameter is provided below, organized by objective (Table 3-1). Note that Table 3-1 does not include all possible options for corrective actions; 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.

Table 3-1 Monitoring Parameters

Objective 1: Reduce the occurrence of invasive plant species (including cogon grass (*Imperata cylindrical*), torpedo grass (*Panicum repens*), popcorn trees/Chinese tallow (*Sapium sebiterum*), Cuban bulrush (*Oxycaryum cubense*), and beach vitex (*Vitex rotundifolia*)) on GUIS through treatment methods.

Parameter	Purpose	Method	Timing, Frequency, Duration	Sample Size and Sites	Performance Criteria	Potential Corrective Action(s)
Area of invasive plants (each of the 5 species)	Monitor progress toward meeting the restoration objective.	Aerial imagery or other ground-based GIS methods.	Minimum of twice, but likely once prior to treatment, once after treatment, and once at the end of the growing season.	Throughout project footprint.	Area is reduced over the term of the project.	Reevaluate treatment methods to advise future efforts.
Percent cover of invasive plants (each of the 5 species)	Monitor progress toward meeting the restoration objective.	Visual field assessment (or aerial photography) of total vegetation percent cover of invasive species using identified plots.	Minimum of twice per year, but likely once prior to treatment, once after treatment, and once at the end of the growing season.	Throughout project footprint.	Percent cover is reduced over the term of the project.	Reevaluate treatment methods to advise future efforts.

4 Monitoring Schedule

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

Table 4-1. Monitoring Schedule

Monitoring Parameters	Pre-execution (i.e., prior to treatment)	Year 1 (after treatment)	Year 2	Year 3	Year 4	Year 5
Area of invasive plants	X	X	X	X	X	X
Percent cover of invasive plants	X	X	X	X	X	X

5 Evaluation

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

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

6 Data Management

6.1 Data Description

Data collected will be compiled within approximately one month after each monitoring event, and aggregated for upload to DIVER approximately once per year. The data collection will occur at GUIS. To the extent practicable, all environmental and biological data generated during monitoring activities will be documented using standardized field datasheets. If standardized datasheets are unavailable or not readily amendable to record project-specific data, then project-specific datasheets will be drafted prior to conducting any project monitoring activities. Original hardcopy datasheets and notebooks and photographs will be retained by the Implementing Trustee.

Relevant project data that are handwritten on hardcopy datasheets or notebooks will be transcribed (entered) into standard digital format. All field datasheets and notebook entries will be scanned to PDF files. Electronic data files should be named with the date on which the file was created and should include a ReadMe file that describes when the file was created and by whom, and any explanatory notes on the file contents. If a data file is revised, a new copy should be made and the original preserved.

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

6.2 Data Review and Clearance

Relevant project data that are handwritten on hardcopy datasheets or notebooks will be transcribed (entered) into standard digital format. After transcription of the data, the electronic data sheets will be verified 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 are: i) entered or converted into agreed upon/commonly used digital format; ii) labeled with metadata following FGDC/ISO standards to the extent practicable and in accordance with Implementing Trustee agency requirements.

After 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 (as described below). Before submitting the monitoring data and information package, co-Implementing Trustees shall confirm with one another that the package is approved for submission.

6.3 Data Storage and Accessibility

Once all data has been QA/QC'ed it will be submitted to the Restoration Portal. Trustees will provide DWH NRDA MAM data and information to the Restoration Portal as soon as possible and no more than one year from when data are collected.

6.4 Data Sharing

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

7 Reporting

All reporting would occur after field surveys are complete for each assessment effort. This report would 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.

8 Roles and Responsibilities

Data will be reviewed and submitted to the Restoration Portal by DOI project personnel.

Monitoring and Adaptive Management Plan for *Deepwater Horizon* NRDA Project:

FM6, St. Vincent National Wildlife Refuge Predator Control

Prepared by: Kate Healy (FWS) and Nadia Martin (IEc); Draft Version Date: 8/5/2018

1 Introduction

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. Where applicable, it identifies key sources of uncertainty and incorporates monitoring data and decision points that address these uncertainties. As not all projects will have the same sources and degree of uncertainty, this project-specific MAM plan is scaled according to level of uncertainty, scope, scale, and restoration type associated with this project.

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

1.1 Project Overview

This project is being implemented as restoration for the DWH oil spill NRDA, consistent with the PDARP/PEIS.

- Programmatic Goal: Restore and Conserve Habitat
- Restoration Type: Habitat Projects on Federally Managed Lands
- Restoration Approach: Protect and conserve marine, coastal, estuarine, and riparian habitats
- Restoration Technique: Develop and implement management actions in conservation areas and/or restoration projects
- TIG: FL TIG
- Restoration Plan: Restoration Plan #1

This restoration project is being implemented within the St. Vincent National Wildlife Refuge (NWR), Apalachicola, FL. This project involves predator control activities to eradicate or control the feral hog and raccoon populations, including locating, trapping, eliminating, and monitoring. This project is intended to protect and conserve habitat on St. Vincent NWR through actions to mitigate the negative impacts of feral hogs and raccoons. This project would directly benefit the habitat in the NWR and wildlife that utilize the area such as shorebirds and sea turtles.

The implementing agency is the DOI, USFWS Gulf Restoration Office. The partner agencies include the St. Vincent NWR staff and the United States Department of Agriculture (USDA)/Animal and Plant Health Inspection Service (APHIS)/ Wildlife Services (WS).

1.2 Restoration Type Goals and Project Restoration Objectives

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

- Restore federally managed habitats that were affected by the oil spill and response actions through an integrated portfolio of restoration approaches across a variety of habitats.
- Restore for injuries to federally managed lands by targeting restoration on federal lands where the injuries occurred, while considering approaches that provide resiliency and sustainability.
- Ensure consistency with land management plans for each designated federal land and its purpose by identifying actions that account for the ecological needs of these habitats.

The project restoration objective is:

- Reduce the number of feral hogs and raccoons (to mitigate their negative impacts on habitats and natural resources managed by the St. Vincent NWR such as habitat deterioration and loss of threatened and endangered species).

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

1.3 Potential Sources of Uncertainty

Potential uncertainties that may affect the success of this project are described below.

Table 1.3-1 Potential Uncertainties

Uncertainty	Summary of Resolution Strategy
Decreased evidence of predation of shorebirds and sea turtles by hogs and raccoons does not occur after hog and raccoon removal.	Conduct targeted monitoring on metrics related to evidence of predation on shorebirds and sea turtles. Monitoring data would be used to refine future management actions.
Decrease in habitat degradation does not occur after feral hog and raccoon removal.	Conduct targeted monitoring on habitat metrics specific to feral hog effects. Monitoring data would be used to refine future management actions.

1.4 Conceptual Model, Anticipated Outcomes and Future Activities

The conceptual model, described below, forms the basis of this monitoring plan, and includes a summary of the project activities, the expected product or output of those activities and the desired project outcomes. The primary management focus of St. Vincent NWR is to provide habitat for the conservation and protection of all species of wildlife inhabiting the refuge, with an emphasis on

ecosystem health and biodiversity. Key to this management focus is the removal of feral hogs and control of raccoon populations. The proposed restoration activities will provide benefits to habitats and natural resources on St. Vincent NWR by addressing known causes of habitat degradation and mortality and/or protection of threatened and endangered species and migratory birds. In addition, management of native wildlife populations (i.e., raccoons) within the refuge boundary will help prevent overpopulation, reduce mortality of select species, and improve the natural diversity of resident wildlife on the refuge.

Table 1.4-1 Conceptual Model

Activity	Output	Short-term outcome	Long-term outcome
Feral hog removal	• Protection and conservation of habitats, wildlife, and threatened and endangered species within the refuge.	• Decreased evidence of predation by hogs on shorebirds and sea turtles. • Decrease in habitat degradation.	• Protection and conservation of native habitat and wildlife.
Control of raccoon populations	• Protection of trust resources (i.e., birds), and threatened and endangered species within the refuge.	• Decreased evidence of predation by raccoons on shorebirds and sea turtles.	• Protection of key trust resources.

2 Adaptive Management

As noted above, there are two potential sources of uncertainty related to this project: 1) whether decreased evidence of predation will occur after project implementation, and 2) whether decreases in habitat degradation will occur after project implementation. To adaptively manage this project, and increase the likelihood of achieving the project objective, the DOI project personnel would conduct targeted monitoring on metrics related to each resource, threatened or endangered species and use the monitoring data to refine future management actions. The DOI project personnel would also conduct targeted monitoring on habitat metrics specific to feral hog impacts and use that data to refine future management actions.

3 Project Monitoring, Performance Criteria, and Potential Corrective Actions

The proposed monitoring plan for this restoration project was developed to evaluate project performance, key uncertainties, and potential corrective actions, if needed. Feral hogs are one of the most prolific and destructive invasive species on the refuge. They have adverse effects on habitat and productivity of most native wildlife, using virtually all habitat components of the landscape and directly competing for food. Feral hog removal is essential to meeting native species protection and enhancement goals of the refuge. Studies indicate that raccoons are a significant predator of nesting shorebirds, sea birds, and sea turtles. Raccoons will be trapped on or near beach-nesting habitat used by shorebirds, sea birds and sea turtles in order to meet native species protection and enhancement goals of the refuge.

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

monitoring activities described below, the project personnel will also be continuing shorebird and sea turtle monitoring efforts, following the approaches outlined in *Breeding Bird Protocol for Florida's Seabirds and Shorebirds* (FWC 2016a) and *Marine Turtle Conservation Handbook* (FWC 2016b).

Information on each monitoring parameter is provided below, organized by objective (Table 3-1). Note that Table 3-1 does not include all possible options for corrective actions; 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.

Table 3-1 Monitoring Parameters

Objective 1: Reduce the number of feral hogs and raccoons (to mitigate their negative impacts on habitats and natural resources managed by the St. Vincent NWR such as habitat deterioration and loss of threatened and endangered species).

Parameter	Purpose	Method	Timing, Frequency, Duration	Sample Size and Sites	Performance Criteria	Potential Corrective Action(s)
Feral hogs removed	Monitor progress toward meeting the restoration objective.	Counts recorded on datasheet or field notebook, and GPS location.	Count and location would be recorded each time a predator is removed for duration of the project and compiled annually.	At St. Vincent NWR.	N/A.	N/A.
Raccoons removed	Monitor progress toward meeting the restoration objective.	Counts recorded on datasheet or field notebook, and GPS location.	Count and location would be recorded each time a predator is removed for duration of the project and compiled annually.	At St. Vincent NWR.	N/A.	N/A.
Evidence of predation at bird and turtle nesting sites	Monitor progress toward meeting the restoration objective	Visual observations of predators and identification and counts of predator tracks and depredated bird and turtle nests, recorded on field datasheet or notebook.	A minimum of quarterly for the duration of the project.	Beachfront of island, according to protocols.	Decrease in evidence of predators over course of project.	Reevaluate methods and results to determine corrective action.

4 Monitoring Schedule

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

Table 4-1 Monitoring Schedule

Monitoring Parameters	Year 1	Year 2
Feral hogs removed	x	x
Raccoons removed	x	x
Evidence of predators	x	x

5 Evaluation

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

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

Data collected on the number of predators removed will be compared to documentation of the evidence of predators over the course of the project. This will allow project implementers to evaluate whether the evidence of predators is decreasing as a result of the project.

6 Data Management

6.1 Data Description

Data collection will be compiled within 12 months after collection. The data collection will occur at the NWR. To the extent practicable, all environmental and biological data generated during monitoring activities will be documented using standardized field datasheets. If standardized datasheets are unavailable or not readily amendable to record project-specific data, then project-specific datasheets will be drafted prior to conducting any project monitoring activities. Original hardcopy datasheets and notebooks and photographs will be retained by the Implementing Trustee.

Relevant project data that are handwritten on hardcopy datasheets or notebooks will be transcribed (entered) into standard digital format. All field datasheets and notebook entries will be scanned to PDF files. Electronic data files should be named with the date on which the file was created and should include a ReadMe file that describes when the file was created and by whom, and any explanatory notes on the file contents. If a data file is revised, a new copy should be made and the original preserved.

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

6.2 Data Review and Clearance

Relevant project data that are handwritten on hardcopy datasheets or notebooks will be transcribed (entered) into standard digital format. After transcription of the data, the electronic data sheets will be verified 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 are: i) entered or converted into agreed upon/commonly used digital format; ii) labeled with metadata following FGDC/ISO standards to the extent practicable and in accordance with Implementing Trustee agency requirements.

After 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 (as described below). Before submitting the monitoring data and information package, co-Implementing Trustees shall confirm with one another that the package is approved for submission.

6.3 Data Storage and Accessibility

Once all data has been QA/QC'ed it will be submitted to the Restoration Portal. Trustees will provide DWH NRDA MAM data and information to the Restoration Portal as soon as possible and no more than one year from when data are collected.

6.4 Data Sharing

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

7 Reporting

All reporting would occur after field surveys are complete for each assessment effort. This report would 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 would be completed that includes:

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

8 Roles and Responsibilities

Data will be reviewed and submitted to the Restoration Portal by DOI USFWS or other project personnel.

9 References

FWC (Florida Fish and Wildlife Conservation Commission). 2016a. Breeding Bird Protocol for Florida's Seabirds and Shorebirds. Tallahassee, Florida.

FWC (Florida Fish and Wildlife Conservation Commission). 2016b. Marine Turtle Conservation Handbook. Tallahassee, Florida.

Monitoring and Adaptive Management Plan for *Deepwater Horizon* NRDA Project:

NR1, Pensacola Bay and Perdido River Watersheds - Nutrient Reduction

Prepared by: Nadia Martin (IEc) and USDA; Draft Version Date: 8/5/2018

1 Introduction

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. Where applicable, it identifies key sources of uncertainty and incorporates monitoring data and decision points that address these uncertainties. As not all projects will have the same sources and degree of uncertainty, this project-specific MAM plan is scaled according to level of uncertainty, scope, scale, and restoration type associated with this project.

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

1.1 Project Overview

This project is being implemented as restoration for the DWH oil spill NRDA, consistent with the PDARP/PEIS.

- Programmatic Goal: Restore Water Quality
- Restoration Type: Nutrient Reduction (non-point source)
- Restoration Approach: Reduce nutrient loads to coastal watersheds
- Restoration Technique: Agricultural conservation practices
- TIG: FL TIG
- Restoration Plan: Restoration Plan #1

This restoration project is being implemented within the Pensacola and Perdido Watersheds, Santa Rosa and Escambia Counties, Florida (HUC 12 Watersheds: (1) Moore Creek – Santa Rosa County and (2) Sandy Hollow-Pine Barren Creek - Escambia County). This project includes the development and implementation of conservation plans (CPs) on agricultural lands, outreach to identify willing landowners, and technical assistance for the participants. This project is intended to improve water quality through the implementation of CPs that include practices to reduce sediment and nutrient loads to coastal watersheds. The proposed CPs would reduce nutrient losses from the landscape, reduce nutrient loads to streams and downstream receiving waters, and reduce water quality degradation in watersheds that would provide benefits to coastal watersheds and marine resources.

The implementing agency is the USDA.

1.2 Restoration Type Goal and Project Restoration Objective

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

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

The project restoration objective is:

- Reduce sediment, phosphorous and nitrogen loads leaving private lands during storm events in the watershed.

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

2 Conceptual Setting and Anticipated Outcomes

A conceptual model for this project includes a summary of the restoration project and the desired project outcomes. For this project, the specific stressors addressed include nutrient and sediment loading, agricultural activities and land cover conversion. This project will reduce those stressors by implementing conservation practices on private agricultural lands that will reduce sedimentation and nutrients that make their way into local waterbodies, resulting in improved water quality.

Table 2-1 Conceptual Model

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 resources

2.1 Potential Sources of Uncertainty

The following uncertainties could potentially influence the success of the project. Efforts will be made in the planning and implementation phases to reduce and/or eliminate these uncertainties.

1. Willingness of landowners to participate. Strategy to resolve: identify other willing landowners.
2. Conservation practices may not result in measurable change in the receiving waters. Strategy to resolve: Conduct targeted in-stream monitoring at locations upstream and downstream of the implementation area. Monitoring data will be used to refine future management actions.
3. Landuse changes (type of agriculture might change), changes in land ownership, significant rain/weather events, unknown contributing sources of nutrients in the watershed, BMPs may not work. Strategy to resolve: adaptively manage the project.

3 Project Monitoring, Performance Criteria, and Potential Corrective Actions

The proposed monitoring for this restoration project was developed to evaluate project performance, key uncertainties, and potential corrective actions, if needed. Information on each monitoring parameter is provided below, organized by objective (Table 3-1). Note that Table 3-1 does not include all possible options for corrective actions; 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.

These parameters will be monitored at the project site, in adjacent streams, and may also be monitored at appropriate reference and/or control sites to demonstrate how the project is trending toward the performance criteria.

Corrective actions that may be necessary include, but are not limited to, regrading/removing water control structures, planting/replanting desirable vegetation, and/or removing nuisance vegetation. Corrective actions will likely occur after implementation, but within the five-year time frame for this project. Corrective actions will be identified by USDA based on site evaluations and performance monitoring data and reports. Costs for addressing the corrective action will be evaluated by USDA to determine feasibility.

Table 3-1 Monitoring Parameters

Objective 1: Reduce sediment, phosphorous and nitrogen loads during storm events leaving private lands in the watershed.

Parameter	Purpose	Method	Timing, Frequency, Duration	Sample Size and Sites	Performance Criteria	Potential Corrective Action(s)
Area of water quality improvements	Documentation of restoration actions.	Estimated area of project footprint (i.e., field, parcel, or farm) and estimated area of project influence (based on in-stream water quality, influence of upland CPs on nearby waterbodies)	Once after CPs are implemented.	One per CP per area type.	TBD, based on preliminary site-specific restoration/conservation planning.	N/A.
Number of water quality improvement practices implemented	Monitor progress toward meeting objective.	Count of number of projects implemented.	Once per year (annually).	All projects implemented.	TBD, based on initial evaluation of the watershed and pre-execution monitoring.	Number of projects implemented by end of project period
Discharge ($m^{3/s}$ or cfs)	Monitor progress toward meeting objective.	Per MAM Manual.	10 measurements per year at one or more sets of one upstream and two downstream stations that bracket portions of the watershed where CPs are being implemented.	No. of sites dependent on the amount and location of CPs. ~10 samples per year at each station. Samples would be taken at baseflow conditions when possible. Sites: Determined when sites are identified. Depending on CPs, could include one upstream station (could be optional depending on upstream conditions) and one or more downstream stations depending on the location of the cluster of conservation practices.	TBD, depending on the CP.	TBD, depending on the CP.
Total Suspended Solids (TSS) (mg/L or ppm) and Turbidity	Monitor progress toward meeting objective.	In-stream. Fixed station parameter reading using a data sonde, under baseflow conditions when possible, using standard monitoring protocols would occur at appropriately located upstream and downstream stations that bracket portions of watersheds with conservation practices.	10 measurements per year at one or more sets of one upstream and two downstream stations that bracket portions of the watershed where CPs are being implemented.	No. of sites dependent on the amount and location of CPs. ~10 samples per year at each station. Samples would be taken at baseflow conditions when possible. Sites: Determined when sites are identified. Depending on CPs, could include one upstream station (could be optional depending on upstream conditions) and one or more downstream stations depending on the location of the cluster of conservation practices.	Reduction in the quantity of in-stream sediment over time.	Actions would vary depending on the type of CPs. Some conservation practices may require inspection and maintenance.

Parameter	Purpose	Method	Timing, Frequency, Duration	Sample Size and Sites	Performance Criteria	Potential Corrective Action(s)
Total Phosphorous (TP) (mg/L)	Monitor progress toward meeting objective.	In-stream. Sample collection using standard monitoring protocols would occur at appropriately located upstream and downstream stations that bracket portions of the area with conservation practices.	10 measurements per year at one or more sets of one upstream and two downstream stations that bracket portions of the watershed where CPs are being implemented.	No. of sites dependent on the amount and location of CPs. ~10 samples per year at each station. Samples would be taken at baseflow conditions when possible. Sites: Determined when sites are identified. Depending on CPs, could include one upstream station (could be optional depending on upstream conditions) and one or more downstream stations depending on the location of the cluster of conservation practices.	Reduction in the quantity of phosphorus over time.	Actions would vary depending on the type of CPs. Some conservation practices may require inspection and maintenance.
Total Nitrogen (TN) (mg/L)	Monitor progress toward meeting objective.	Sample collection using standard monitoring protocols will occur at appropriately located upstream and downstream stations that bracket portions of areas where conservation activities are being implemented	10 measurements per year at one or more sets of one upstream and two downstream stations that bracket portions of the watershed where CPs are being implemented.	No. of sites dependent on the amount and location of CPs. ~10 samples per year at each station. Samples would be taken at baseflow conditions when possible. Sites: Determined when sites are identified. Depending on CPs, could include one upstream station (could be optional depending on upstream conditions) and one or more downstream stations depending on the location of the cluster of conservation practices.	Reduction in the quantity of nitrogen over time.	Actions would vary depending on the type of CPs. Some conservation practices may require inspection and maintenance.

4 Monitoring Schedule

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

Table 4-1 Monitoring Schedule

Monitoring Parameter	Pre-Execution Monitoring	As-Built (year 0)	Post-Execution Monitoring (Years 1-4)
Area of water quality improvements	N/A	N/A	X
Number of projects implemented	N/A	N/A	X
Discharge	N/A	N/A	X
TSS	X	X	X
TP	X	X	X
TN	X	X	X

5 Adaptive Management

The need for adaptive management on specific CPs being implemented is unlikely to be needed due to the nature of the sampling approaches, the objectives of the project and the scales of the sites in which the data will be collected, and an understanding of the CPs that will be applied. However, adaptive management will be incorporated in the CPs, based on water quality monitoring, as described in Sections 3 and 4, above. Adaptive management will also be applied at the level of the watershed to ensure that the number of sites, locations, and total area subjected to the standard Restoration Techniques are sufficient to reduce the overall nutrient and sediment load, as described in Section 2, above. Situations that might lead to adaptive management include a farmer joining the program and then backing out, participants selling their property or changing farming practices. Adaptive management of specific CPs could be included in each CP, as appropriate. Data, analysis, and information obtained from this project will be used to help inform future Restoration Plan development, priorities and project selection and implementation.

6 Evaluation

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

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

7 Data Management

The entity collecting the data (e.g., county or management district) may have additional data management protocols to those described below.

7.1 Data Description

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

Relevant data that are handwritten on hardcopy datasheets or notebooks will be transcribed (entered) into standard digital format. All field datasheets and notebook entries will be scanned to PDF files. Electronic data files should be named with the date on which the file was created and should include a ReadMe file that describes when the file was created and by whom, and any explanatory notes on the file contents. If a data file is revised, a new copy should be made and the original preserved.

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

7.2 Data Review and Clearance

Relevant Project data that are handwritten on hardcopy datasheets or notebooks will be transcribed (entered) into standard digital format. After transcription of the data, the electronic data sheets will be verified 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 i) entered or converted into agreed upon/commonly used digital format; ii) labeled with metadata following FGDC/ISO standards to the extent practicable and in accordance with Implementing Trustee agency requirements.

After 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 (as described below). Before submitting the monitoring data and information package, co-Implementing Trustees shall confirm with one another that the package is approved for submission.

7.3 Data Storage and Accessibility

Once all data has been QA/QC'ed it will be submitted to the Restoration Portal. Trustees will provide DWH NRDA MAM data and information to the Restoration Portal as soon as possible and no more than one year from when data are collected.

7.4 Data Sharing

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

8 Reporting

Once all data have been reviewed for accuracy and completeness, they will be submitted to the Restoration Portal. Data will be made publicly available through the DIVER Explorer Interface.

9 Roles and Responsibilities

Data will be reviewed and submitted to the Restoration Portal by USDA project personnel.

Monitoring and Adaptive Management Plan for *Deepwater Horizon* NRDA Project:

NR3, Lower Suwannee River Watershed - Nutrient Reduction

Prepared by: Nadia Martin (IEc) and USDA; Draft Version Date: 8/5/2018

1 Introduction

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. Where applicable, it identifies key sources of uncertainty and incorporates monitoring data and decision points that address these uncertainties. As not all projects will have the same sources and degree of uncertainty, this project-specific MAM plan is scaled according to level of uncertainty, scope, scale, and restoration type associated with this project.

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

1.1 Project Overview

This project is being implemented as restoration for the DWH oil spill NRDA, consistent with the PDARP/PEIS.

- Programmatic Goal: Restore Water Quality
- Restoration Type: Nutrient Reduction (non-point source)
- Restoration Approach: Reduce nutrient loads to coastal watersheds
- Restoration Technique: Agricultural conservation practices
- TIG: FL TIG
- Restoration Plan: Restoration Plan #1

This restoration project is being implemented within the Lower Suwannee River watershed in Levy County, Florida. This project includes the development and implementation of conservation plans (CPs) on agricultural lands, outreach to identify willing landowners, and technical assistance for the participants. This project is intended to improve water quality through the implementation of CPs that include practices to reduce sediment and nutrient loads to coastal watersheds. The proposed CPs would reduce nutrient losses from the landscape, reduce nutrient loads to streams and downstream receiving waters, and reduce water quality degradation in watersheds that would provide benefits to coastal watersheds and marine resources.

The implementing agency is the USDA.

1.2 Restoration Type Goal and Project Restoration Objective

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

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

The project restoration objective is:

- Reduce sediment, phosphorous and nitrogen loads during storm events leaving private lands in the watershed.

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

2 Conceptual Setting and Anticipated Outcomes

A conceptual model for this project includes a summary of the restoration project and the desired project outcomes. For this project, the specific stressors addressed include nutrient and sediment loading, agricultural activities and land cover conversion. This project will reduce those stressors by implementing conservation practices on private agricultural lands that will reduce sedimentation and nutrients that make their way into local waterbodies, resulting in improved water quality.

Table 1: Conceptual Model

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 resources

2.1 Potential Sources of Uncertainty

The following uncertainties could potentially influence the success of the project. Efforts will be made in the planning and implementation phases to reduce and/or eliminate these uncertainties.

4. Willingness of landowners to participate. Strategy to resolve: identify other willing landowners.
5. Conservation practices may not result in measurable change in the receiving waters. Strategy to resolve: Conduct targeted in-stream monitoring at locations upstream and downstream of the implementation area. Monitoring data will be used to refine future management actions.
6. Landuse changes (type of agriculture might change), changes in land ownership, significant rain/weather events, unknown contributing sources of nutrients in the watershed, BMPs may not work. Strategy to resolve: adaptively manage the project.

3 Project Monitoring, Performance Criteria, and Potential Corrective Actions

The proposed monitoring for this restoration project was developed to evaluate project performance, key uncertainties, and potential corrective actions, if needed. Information on each monitoring parameter is provided below, organized by objective (Table 3-1). Note that Table 3-1 does not include all possible options for corrective actions; 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.

These parameters will be monitored at the project site, in adjacent streams, and may also be monitored at appropriate reference and/or control sites to demonstrate how the project is trending toward the performance criteria.

Corrective actions that may be necessary include, but are not limited to, regrading/removing water control structures, planting/replanting desirable vegetation, and/or removing nuisance vegetation. Corrective actions will likely occur after implementation, but within the five-year time frame for this project. Corrective actions will be identified by USDA based on site evaluations and performance monitoring data and reports. Costs for addressing the corrective action will be evaluated by USDA to determine feasibility.

Table 3-1 Monitoring Parameters

Objective 1: Reduce sediment, phosphorous and nitrogen loads during storm events leaving private lands in the watershed.

Parameter	Purpose	Method	Timing, Frequency, Duration	Sample Size and Sites	Performance Criteria	Potential Corrective Action(s)
Area of water quality improvements	Documentation of restoration actions.	Estimated area of project footprint (i.e., field, parcel, or farm) and estimated area of project influence (based on in-stream water quality, influence of upland CPs on nearby waterbodies)	Once after CPs are implemented.	One per CP per area type.	TBD, based on preliminary site-specific restoration/conservation planning.	N/A.
Number of water quality improvement practices implemented	Monitor progress toward meeting objective.	Count of number of projects implemented.	Once per year (annually).	All projects implemented.	TBD, based on initial evaluation of the watershed and pre-execution monitoring.	Number of projects implemented by end of project period
Discharge ($m^{3/s}$ or cfs)	Monitor progress toward meeting objective.	Per MAM Manual.	10 measurements per year at one or more sets of one upstream and two downstream stations that bracket portions of the watershed where CPs are being implemented.	No. of sites dependent on the amount and location of CPs. ~10 samples per year at each station. Samples would be taken at baseflow conditions when possible. Sites: Determined when sites are identified. Depending on CPs, could include one upstream station (could be optional depending on upstream conditions) and one or more downstream stations depending on the location of the cluster of conservation practices.	TBD, depending on the CP.	TBD, depending on the CP.
Total Suspended Solids (TSS) (mg/L or ppm) and Turbidity	Monitor progress toward meeting objective.	In-stream. Fixed station parameter reading using a data sonde, under baseflow conditions when possible, using standard monitoring protocols would occur at appropriately located upstream and downstream stations that bracket portions of watersheds with conservation practices.	10 measurements per year at one or more sets of one upstream and two downstream stations that bracket portions of the watershed where CPs are being implemented.	No. of sites dependent on the amount and location of CPs. ~10 samples per year at each station. Samples would be taken at baseflow conditions when possible. Sites: Determined when sites are identified. Depending on CPs, could include one upstream station (could be optional depending on upstream conditions) and one or more downstream stations depending on the location of the cluster of conservation practices.	Reduction in the quantity of in-stream sediment over time.	Actions would vary depending on the type of CPs. Some conservation practices may require inspection and maintenance.

Parameter	Purpose	Method	Timing, Frequency, Duration	Sample Size and Sites	Performance Criteria	Potential Corrective Action(s)
Total Phosphorous (TP) (mg/L)	Monitor progress toward meeting objective.	In-stream. Sample collection using standard monitoring protocols would occur at appropriately located upstream and downstream stations that bracket portions of the area with conservation practices.	10 measurements per year at one or more sets of one upstream and two downstream stations that bracket portions of the watershed where CPs are being implemented.	No. of sites dependent on the amount and location of CPs. ~10 samples per year at each station. Samples would be taken at baseflow conditions when possible. Sites: Determined when sites are identified. Depending on CPs, could include one upstream station (could be optional depending on upstream conditions) and one or more downstream stations depending on the location of the cluster of conservation practices.	Reduction in the quantity of phosphorus over time.	Actions would vary depending on the type of CPs. Some conservation practices may require inspection and maintenance.
Total Nitrogen (TN) (mg/L)	Monitor progress toward meeting objective.	Sample collection using standard monitoring protocols will occur at appropriately located upstream and downstream stations that bracket portions of areas where conservation activities are being implemented	10 measurements per year at one or more sets of one upstream and two downstream stations that bracket portions of the watershed where CPs are being implemented.	No. of sites dependent on the amount and location of CPs. ~10 samples per year at each station. Samples would be taken at baseflow conditions when possible. Sites: Determined when sites are identified. Depending on CPs, could include one upstream station (could be optional depending on upstream conditions) and one or more downstream stations depending on the location of the cluster of conservation practices.	Reduction in the quantity of nitrogen over time.	Actions would vary depending on the type of CPs. Some conservation practices may require inspection and maintenance.

4 Monitoring Schedule

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

Table 4-1 Monitoring Schedule

Monitoring Parameter	Pre-Execution Monitoring	As-Built (year 0)	Post-Execution Monitoring (Years 1-4)
Area of water quality improvements	N/A	N/A	X
Number of projects implemented	N/A	N/A	X
Discharge	N/A	N/A	X
TSS	X	X	X
TP	X	X	X
TN	X	X	X

5 Adaptive Management

The need for adaptive management on specific CPs being implemented is unlikely to be needed due to the nature of the sampling approaches, the objectives of the project and the scales of the sites in which the data will be collected, and an understanding of the CPs that will be applied. However, adaptive management will be incorporated in the CPs, based on water quality monitoring, as described in Sections 3 and 4, above. Adaptive management will also be applied at the level of the watershed to ensure that the number of sites, locations, and total area subjected to the standard Restoration Techniques are sufficient to reduce the overall nutrient and sediment load, as described in Section 2, above. Situations that might lead to adaptive management include a farmer joining the program and then backing out, participants selling their property or changing farming practices. Adaptive management of specific CPs could be included in each CP, as appropriate. Data, analysis, and information obtained from this project will be used to help inform future Restoration Plan development, priorities and project selection and implementation.

6 Evaluation

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

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

7 Data Management

7.1 Data Description

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

Relevant Project data that are handwritten on hardcopy datasheets or notebooks will be transcribed (entered) into standard digital format. All field datasheets and notebook entries will be scanned to PDF files. Electronic data files should be named with the date on which the file was created and should include a ReadMe file that describes when the file was created and by whom, and any explanatory notes on the file contents. If a data file is revised, a new copy should be made and the original preserved.

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

7.2 Data Review and Clearance

Relevant Project data that are handwritten on hardcopy datasheets or notebooks will be transcribed (entered) into standard digital format. After transcription of the data, the electronic data sheets will be verified 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 i) entered or converted into agreed upon/commonly used digital format; ii) labeled with metadata following FGDC/ISO standards to the extent practicable and in accordance with Implementing Trustee agency requirements.

After 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 (as described below). Before submitting the monitoring data and information package, co-Implementing Trustees shall confirm with one another that the package is approved for submission.

7.3 Data Storage and Accessibility

Once all data has been QA/QC'ed it will be submitted to the Restoration Portal. Trustees will provide DWH NRDA MAM data and information to the Restoration Portal as soon as possible and no more than one year from when data are collected.

7.4 Data Sharing

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

8 Reporting

Once all data have been reviewed for accuracy and completeness, they will be submitted to the Restoration Portal. Data will be made publicly available through the DIVER Explorer Interface.

9 Roles and Responsibilities

USDA project personnel will be responsible for all aspects of data collection, data review, data management, data analysis, and submission to the Restoration Portal, project adaptive management, and reporting.

Monitoring and Adaptive Management Plan for *Deepwater Horizon* NRDA Project:

WQ1, Carpenter Creek Headwaters Water Quality Improvements

Prepared by: Nadia Martin (IEc) and FDEP; Draft Version Date: 8/5/2018

1 Introduction

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. Where applicable, it identifies key sources of uncertainty and incorporates monitoring data and decision points that address these uncertainties. As not all projects will have the same sources and degree of uncertainty, this project-specific MAM plan is scaled according to level of uncertainty, scope, scale, and restoration type associated with this project.

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

1.1 Project Overview

This project is being implemented as restoration for the DWH oil spill NRDA, consistent with the PDARP/PEIS.

- Programmatic Goal: Restore Water Quality
- Restoration Type Water Quality
- Restoration Approach: Reduce pollution and hydrologic degradation to coastal watersheds
- Restoration Technique: Traditional stormwater control measures
- TIG: FL TIG
- Restoration Plan: Restoration Plan #1

This restoration project would be implemented within Escambia County, around Carpenter Creek, Bayou Texar, and the City of Pensacola. The project includes restoration of a county-owned wetland, acquisition of land, and construction of a stormwater treatment facility to capture and treat stormwater that flows off Olive Road into Carpenter Creek. The project would improve water quality in Carpenter Creek and Bayou Texar, which flow into Pensacola Bay.

The implementing agency is FDEP. Partner agencies include Escambia County, City of Pensacola, Pensacola and Perdido Bays Estuary Program, Emerald CoastKeeper, UWF, Bayou Texar Foundation, UF IFAS Extension, Washington High School Marine Science Academy, Bream Fishermen Association, and the Audubon Society (Florida chapter).

1.2 Restoration Type Goals and Project Restoration Objectives

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

- Reduce pollutant loadings, including nutrients and pathogens, to priority watersheds along the Florida coast that are threatened by chronic eutrophication, harmful algal blooms, hypoxia, habitat losses, or beach and shellfish closures associated with water quality degradation;
- Mitigate high-volume flows and prevent dramatic shifts in salinity that threaten many coastal habitats and resources along the Gulf Coast;
- Where appropriate, co-locate pollutant reduction projects with other restoration projects to enhance ecological services provided by other restoration approaches (PDARP/PEIS Section 5.5.5.1).

The project restoration objectives are:

- Engineer and construct traditional SCMs, including a stormwater treatment facility and restoration of a former wetland;
- Improve water quality in Carpenter Creek and Bayou Texar by providing additional water treatment and reducing pollution and hydrologic degradation.

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

2 Adaptive Management

Due to the nature of this project, and the use of standard Restoration Techniques that have been used successfully in similar projects, the FL TIG determined that adaptive management is unlikely to be necessary for this project. However, monitoring would be conducted, as described in Section 3, below. If the SCMs do not meet the stated performance criteria, potential corrective actions would be identified.

3 Project Monitoring, Performance Criteria, and Potential Corrective Actions

The proposed monitoring for this restoration project was developed to evaluate project performance, key uncertainties, and potential corrective actions, if needed. Information on each monitoring parameter is provided below, organized by objective (Table 3-1). Note that Table 3-1 does not include all possible options for corrective actions; 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.

Monitoring for this project would include sampling from seven to ten storm events. If possible, monitored events would be discrete rainfall events generally consisting of greater than 0.20 inches and less than 1.5 inches of rain. However, this would depend on field conditions and storm events; actual rainfall may vary as well as the drainage area, amount of impervious area, and time of concentration. Monitoring would generally be conducted at two locations: inflows and outflows.

Table 3-1 Monitoring Parameters

Objectives	Parameter	Purpose	Method	Timing, Frequency, Duration	Sample Size and Sites	Performance Criteria	Potential Corrective Action(s)
1: Engineer and construct traditional SCMs, including a stormwater treatment facility and restoration of a former wetland.	Infrastructure constructed and/or enhanced and completed as designed	Monitor progress (determine if SCMs are constructed as designed)	Review of as-built drawings and Professional Engineer Certification of Completion of Construction.	Once post construction.	N/A.	SCMs constructed are in substantial conformance with approved plans.	Reconstruct SCMs to be in substantial conformance with approved plans.
2: Improve water quality in Carpenter Creek and Bayou Texar by providing additional water treatment and reducing pollution and hydrologic degradation.	Number of water quality improvement practices implemented	Document restoration actions	Count of the number of SCMs implemented.	Once after project execution is complete.	All SCMs implemented; all sites.	1.	N/A.
2: Improve water quality in Carpenter Creek and Bayou Texar by providing additional water treatment and reducing pollution and hydrologic degradation.	Area of water quality improvement practices	Document area of restoration	Documentation of estimated area of project influence in sub-basin.	Once post construction	N/A.	As-built acreage matches final construction drawings.	N/A.
2: Improve water quality in Carpenter Creek and Bayou Texar by providing additional water treatment and reducing pollution and hydrologic degradation.	Daily rainfall	Determine if rainfall sufficient for sampling	Automated rain gauge, with verification from the local weather station.	Daily until 7-10 suitable storm events are sampled.	One site near constructed SCMs.	Suitable rain events for monitoring generally consist of greater than 0.20 inches and less than 1.5 inches of rain.	Adjust duration of sampling for a sufficient number (7-10) of sampling events
2: Improve water quality in Carpenter Creek and Bayou Texar by providing additional water treatment and reducing pollution and hydrologic degradation.	Flow	Help measure pollutant loadings (used along with concentrations)	Approved flow activated flow meters.	7-10 storm events.	Inflows and outflows for each storm event from SCMs constructed.	N/A.	Repair or replace flow meters.
2: Improve water quality in Carpenter Creek and	Total nitrogen (TN)	Monitor progress in	Flow weighted composite samples	7-10 storm events; typically, the samples will be composited over	Inflows and outflows for each storm	Average of 25% reduction in pollutant	Potential actions would vary depending on

Objectives	Parameter	Purpose	Method	Timing, Frequency, Duration	Sample Size and Sites	Performance Criteria	Potential Corrective Action(s)
Bayou Texar by providing additional water treatment and reducing pollution and hydrologic degradation.		reducing pollutant loadings	taken over the storm hydrograph.	the inflow hydrograph at the inflow and for up to a 36-hour period at outflow station, depending upon the time of concentration and flow into and out of the SCM.	event from SCMs constructed; each composite would include at least 6 evenly distributed sub-samples.	loading (inflow versus outflow) over the 7-10 storm events monitored.	deviation from specified performance criteria, but could include baffle boxes, or additional plantings within the pond to increase pollutant removals.
2: Improve water quality in Carpenter Creek and Bayou Texar by providing additional water treatment and reducing pollution and hydrologic degradation.	Total phosphorus (TP)	Monitor progress in reducing pollutant loadings	Flow weighted composite samples taken over the storm hydrograph.	7-10 storm events; typically, the samples would be composited over the inflow hydrograph at the inflow and for up to a 36-hour period at outflow station, depending upon the time of concentration and flow into and out of the SCM.	Inflows and outflows for each storm event from SCMs constructed; each composite would include at least 6 evenly distributed sub-samples.	Average of 50% reduction in pollutant loading (inflow versus outflow) over the 7-10 storm events monitored.	Potential actions would vary depending on deviation from specified performance criteria, but could include baffle boxes, or additional plantings within the pond to increase pollutant removals.

4 Monitoring Schedule

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

Table 4-1 Monitoring Schedule

Monitoring Parameters	Pre-Execution	Post-Execution[1]
Infrastructure constructed and/or enhanced and completed as designed	N/A	X
Number of water quality improvement practices implemented	N/A	X
Area of water quality improvement practices	N/A	X
Daily rainfall	N/A	X
Flow	N/A	X
Total nitrogen (TN)	N/A	X
Total phosphorus (TP)	N/A	X
[1] Schedule for post-execution monitoring would depend on rainfall and storm events.		

5 Evaluation

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

- *Were the project restoration objectives achieved? If not, is there a reason why they were not met?* The FL TIG anticipates comparing inflow and outflow data to determine whether water quality (including TN and TP levels) performance criteria has been met.
- *Did the restoration project produce unanticipated effects?* The FL TIG anticipates keeping track of unanticipated effects, as applicable, to help with future restoration planning efforts.
- *Were there unanticipated events unrelated to the restoration project that potentially affected the monitoring results (e.g., hurricanes)?* The FL TIG anticipates keeping track of any unanticipated events, such as unusual climatic conditions, and using that information to determine whether the event impacted the restoration project or monitoring results.
- *Were any of the uncertainties identified prior to project implementation resolved?* The FL TIG would determine whether uncertainties were identified prior to the project, and if not, how these uncertainties may be identified prior to future restoration projects to help improve likelihood of success.
- *Were any new uncertainties identified?*

6 Data Management

6.1 Data Description

All data collected, analyzed, and reported will comply with the Chapter 62-160, Florida Administrative Code (F.A.C.), Quality Assurance, which is the FDEP rule that specifies the minimum field and laboratory quality assurance, methodology, reporting, auditing and data usability requirements for environmental data measurements for DEP programs.

Rainfall data collection will occur after implementation of the SCMs, and water quality will be sampled during each of the storm events. Rainfall data collection will occur at a site near the constructed SCMs

and the flow-weighted water quality samples will be collected at suitable SCMs input and output location.

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

Relevant Project data that are handwritten on hardcopy datasheets or notebooks will be transcribed (entered) into standard digital format. All field datasheets and notebook entries will be scanned to PDF files. Electronic data files should be named with the date on which the file was created and should include a ReadMe file that describes when the file was created and by whom, and any explanatory notes on the file contents. If a data file is revised, a new copy should be made and the original preserved.

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

6.2 Data Review and Clearance

Relevant Project data that are handwritten on hardcopy datasheets or notebooks will be transcribed (entered) into standard digital format. After transcription of the data, the electronic data sheets will be verified 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 i) entered or converted into agreed upon/commonly used digital format; ii) labeled with metadata following FGDC/ISO standards to the extent practicable and in accordance with Implementing Trustee agency requirements.

After 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 (as described below). Before submitting the monitoring data and information package, co-Implementing Trustees shall confirm with one another that the package is approved for submission.

6.3 Data Storage and Accessibility

Once all data has been QA/QC'ed it will be submitted to the Restoration Portal. Trustees will provide DWH NRDA MAM data and information to the Restoration Portal as soon as possible and no more than one year from when data are collected.

6.4 Data Sharing

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

7 Reporting

Once all data have been reviewed for accuracy and completeness, they will be submitted to the Restoration Portal. Data will be made publicly available through the DIVER Explorer Interface.

8 Roles and Responsibilities

Data will be reviewed and submitted to the Restoration Portal by FDEP project personnel.

Monitoring and Adaptive Management Plan for *Deepwater Horizon* NRDA Project:

WQ2, Pensacola Beach Reclaimed Water System Expansion

Prepared by: Nadia Martin (IEc) and FDEP; Draft Version Date: 8/5/2018

1 Introduction

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. Where applicable, it identifies key sources of uncertainty and incorporates monitoring data and decision points that address these uncertainties. As not all projects will have the same sources and degree of uncertainty, this project-specific MAM plan is scaled according to level of uncertainty, scope, scale, and restoration type associated with this project.

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

1.1 Project Overview

This project is being implemented as restoration for the DWH oil spill NRDA, consistent with the PDARP/PEIS.

- Programmatic Goal: Restore Water Quality
- Restoration Type Water Quality
- Restoration Approach: Reduce pollution and hydrologic degradation to coastal watersheds
- Restoration Technique: Expand reclaimed water system
- TIG: FL TIG
- Restoration Plan: Restoration Plan #1

This restoration project would be implemented in Pensacola Beach, Escambia County, Florida. The project aims to reduce the discharge of nutrients and other pollutants into Santa Rosa Sound by expanding the ECUA's Pensacola Beach Reclaimed Water System. This project includes making additional reclaimed water available to the Santa Rosa Island Authority for irrigation of more public rights-of-way and making reclaimed water available for irrigation of commercial and residential areas on Santa Rosa Island.

The implementing agency is FDEP. Partner agencies include Emerald Coast Utilities Authority (ECUA) and NWFWMD.

1.2 Restoration Type Goals and Project Restoration Objectives

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

- Reduce pollutant loadings, including nutrients and pathogens, to priority watersheds along the Florida coast that are threatened by chronic eutrophication, harmful algal blooms, hypoxia, habitat losses, or beach and shellfish closures associated with water quality degradation;
- Mitigate high-volume flows and prevent dramatic shifts in salinity that threaten many coastal habitats and resources along the Gulf Coast;
- Where appropriate, co-locate pollutant reduction projects with other restoration projects to enhance ecological services provided by other restoration approaches (PDARP/PEIS Section 5.5.5.1).

The project restoration objectives are:

- To reduce nutrient concentrations and loadings and improve water quality in the Santa Rosa Sound.
- To make additional reclaimed water available to the Santa Rosa Island Authority for irrigation of more public rights-of-way and make reclaimed water available for irrigation of commercial and residential areas on Santa Rosa Island.

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

2 Adaptive Management

Due to the nature of this project, and the use of standard approaches and Restoration Techniques that have been successfully implemented in similar projects, the FL TIG does not anticipate the need for rigorous adaptive management of the project. If project objectives are not being met, the FL TIG will identify corrective actions as necessary.

3 Project Monitoring, Performance Criteria, and Potential Corrective Actions

The proposed monitoring for this restoration project was developed to evaluate project performance, key uncertainties, and potential corrective actions, if needed. Information on each monitoring parameter is provided below, organized by objective (Table 3-1). Note that Table 3-1 does not include all possible options for corrective actions; 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.

Table 3-1 Monitoring Parameters

Objective 1: reduce nutrient concentrations and improve water quality in the Santa Rosa Sound.

Parameter	Purpose	Method	Timing, Frequency, Duration	Sample Size and Sites	Performance Criteria	Potential Corrective Action(s)
Number of water quality improvement practices implemented	Document restoration actions.	Count of the number of improvement practices implemented	Document restoration actions.	N/A.	1.	N/A.
Acres of water quality improvement practices implemented	Document area of restoration.	Aerial imagery or GIS mapping to estimate area.	Document area of restoration.	N/A.	N/A.	N/A.
Outfall Flow	Monitor progress toward meeting the restoration objective	Recording Flow Meter with Totalizer	Continuous	At the outfall and the WWTP	Reduction in flow.	N/A.
Reuse Flow	Monitor progress toward meeting the restoration objective	Recording Flow Meter with Totalizer	Continuous	Flow meter in Plant Reuse Line from Reuse Pump Station	Increase in flow.	N/A.
Total nitrogen (TN)	Monitor progress toward meeting the restoration objective	24-hr FPC	Weekly	At the outfall and the WWTP	Reduction in nitrogen.	N/A.
Total phosphorus (TP)	Monitor progress toward meeting the restoration objective	24-hr FPC	Weekly	At the outfall and the WWTP	Reduction in phosphorus.	N/A.

4 Monitoring Schedule

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

Table 4-1 Monitoring Schedule

Monitoring Parameters	Pre-Execution	Post-Execution
Number of water quality improvement practices implemented	N/A	X
Acres of water quality improvement practices implemented	N/A	X
Flow	X	X
Total nitrogen (TN)	X	X
Total phosphorus (TP)	X	X

5 Evaluation

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

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

6 Data Management

6.1 Data Description

This project will be monitored through the use of Discharge Monitoring Reports (DMRs) required by the NPDES permit for the ECUA WWTP. The permit requires ECUA to monitor flow and TN and TP concentrations from the outfall from the WWTP, from which TN and TP loadings can be calculated. In addition reuse flows are also monitored. Flow and TN and TP loadings from the outfall will be compared over time as the reuse system is expanded to document the reductions of flow and pollutant loadings into Santa Rosa Sound. Reuse flows will also be monitored to document the increase in reuse. As an NPDES regulated entity ECUA is required to electronically submit DMRs, pursuant Title 40 Code of Federal Regulations (CFR) §127.16, and Rule 62-620.100, F.A.C.

The NPDES permit requires strict sampling, analytic methods, reporting, and data QA/QC requirements, and therefore the FL-TIG has a high level of confidence over the DMR information.

6.2 Data Review and Clearance

As discussed above this project will be monitored through use of Discharge Monitoring Reports (DMRs) required by the NPDES permit for the ECUA WWTP. The NPDES permit includes specific provisions on sampling, analytic methods, reporting, and data QA/QC requirements (FDEP 2015). Use of electronic DMR reporting minimizes the potential for data transcription errors. Implementing Trustees will verify and validate MAM data and information and will ensure that all data are: i) entered or converted into agreed upon/commonly used digital format; ii) labeled with metadata following FGDC/ISO standards to the extent practicable and in accordance with Implementing Trustee agency requirements.

After 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 (as described below). Before submitting the monitoring data and information package, co-Implementing Trustees shall confirm with one another that the package is approved for submission.

6.3 Data Storage and Accessibility

Once all data has been QA/QC'ed it will be submitted to the Restoration Portal. Trustees will provide DWH NRDA MAM data and information to the Restoration Portal as soon as possible and no more than one year from when data are collected.

6.4 Data Sharing

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

7 Reporting

Annual reports would summarize the findings for the reporting period in a digital format and presented in tabular and graphical formats.

8 Roles and Responsibilities

Data will be reviewed and submitted to the Restoration Portal by FDEP project personnel.

9 References

FDEP. 2018. FL0024007-009 permit to operate the Pensacola Beach WWTP, issued under Chapter 403, Florida Statutes.

Monitoring and Adaptive Management Plan for *Deepwater Horizon* NRDA Project:

WQ3, Rattlesnake Bluff Road and Riverbank Restoration

Prepared by: Nadia Martin (IEc) and DOI; Draft Version Date: 8/5/2018

1 Introduction

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. Where applicable, it identifies key sources of uncertainty and incorporates monitoring data and decision points that address these uncertainties. As not all projects will have the same sources and degree of uncertainty, this project-specific MAM plan is scaled according to level of uncertainty, scope, scale, and restoration type associated with this project.

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

1.1 Project Overview

This project is being implemented as restoration for the DWH oil spill NRDA, consistent with the PDARP/PEIS.

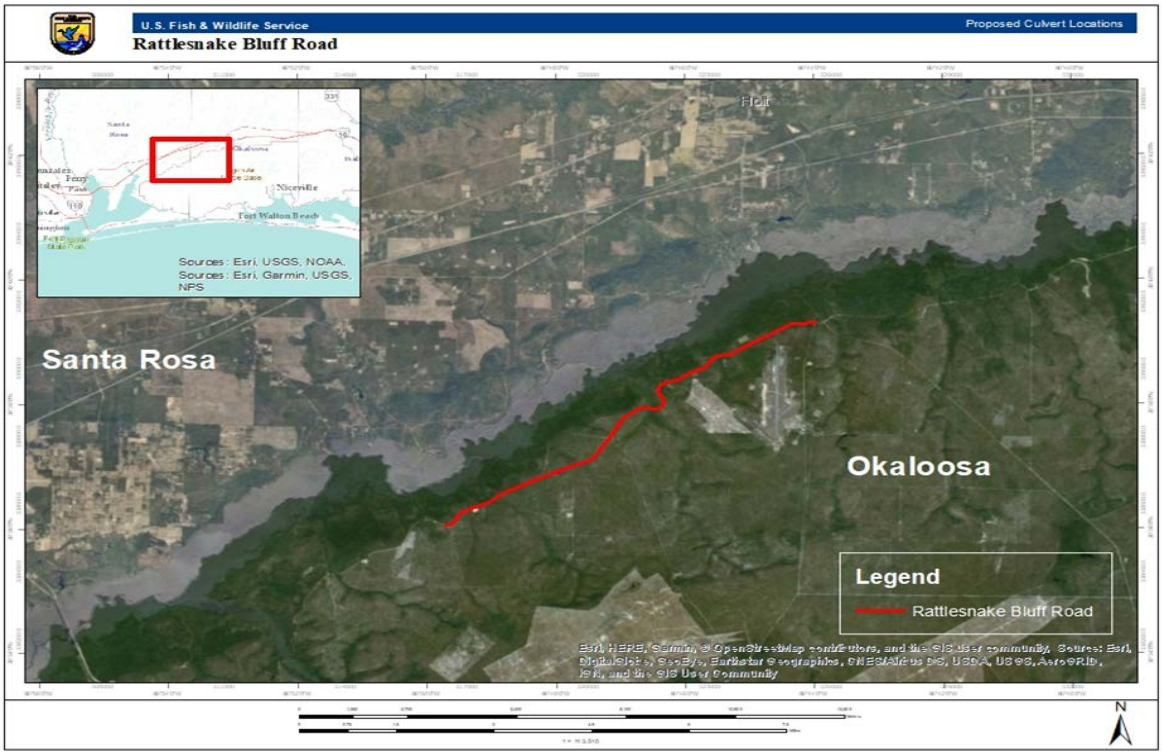
- Programmatic Goal: Restore Water Quality
- Restoration Type: Water Quality
- Restoration Approach: Reduce sediment loads to coastal watersheds
- Restoration Technique: Erosion and sediment control (ESC) practices
- TIG: FL TIG
- Restoration Plan: Restoration Plan #1

This restoration project would take place along Rattlesnake Bluff Road, in Santa Rosa and Okaloosa counties, Florida. Restoration activities would include, but are not limited to: replacement of undersized culverts at up to six priority stream crossings and stabilization of the roadway. These restoration activities are intended to provide increased retention and assimilation of runoff and reduce excessive sediment entering the Yellow River via Rattlesnake Bluff Road.

The implementing agency is the DOI. Partner agencies include the FDEP, USFWS, U.S. Department of Defense, Eglin Air Force Base, FWC, TNC, and Okaloosa County.

Rattlesnake Bluff Road was documented as a major contributor to altered hydrology and impaired water quality, and was among one of the highest priority areas for restoration in the Yellow River in a study

conducted by The Nature Conservancy (Herrington et al., 2010). Twenty impaired unpaved road crossings were identified on Rattlesnake Bluff Road (Herrington et al., 2010). Each unpaved road crossing was given a Severity Score (USFWS, 2005 and 2006) and assigned one of three categories of increasing impairment of Low, Moderate, or High (Herrington et al., 2010). Rattlesnake Bluff Road is comprised of three High, ten Moderate, and seven Low risk impaired sites. Impaired sites crossed small tributaries which drain directly into the Yellow River basin and were classified impaired primarily due to undersized and improperly positioned culverts and bare soils, ditches, and outlets. Undersized culverts constrict the floodplain, altering hydrology and water quality by accumulating sediments upstream and excessive scour downstream. Roadways and shoulders are actively eroding and contribute moderate to severe sedimentation during rain events (Herrington et al., 2010).



1.2 Restoration Type Goals and Project Restoration Objectives

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

- Reduce pollutant loadings, including nutrients and pathogens, to priority watersheds along the Florida coast that are threatened by chronic eutrophication, harmful algal blooms, hypoxia, habitat losses, or beach and shellfish closures associated with water quality degradation;
- Mitigate high-volume flows and prevent dramatic shifts in salinity that threaten many coastal habitats and resources along the Gulf Coast;
- Where appropriate, co-locate pollutant reduction projects with other restoration projects to enhance ecological services provided by other restoration approaches (PDARP/PEIS Section 5.5.5.1).

The goals of the project include measures to mitigate the negative impacts of excessive sedimentation to water quality, habitats and ecological resources of the Yellow River basin from Rattlesnake Bluff Road, including road stabilization and culvert replacement at priority impaired sites/stream crossings.

The project restoration objectives are:

- Reduce pollution and hydrologic degradation to coastal watersheds.
- Reduce excessive sedimentation to the Yellow River via Rattlesnake Bluff Road.

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

1.3 Potential Sources of Uncertainty

The primary source of uncertainty for this project is related to the replacement of undersized culverts and stabilization of roadways as designed, on schedule, and on budget. Other uncertainties include impact from potential storms, as well as the longevity and effectiveness of the materials proposed to be used for construction. Efforts will be made in the research and design, and planning and implementation phases of the project to reduce and/or eliminate these uncertainties.

1.4 Conceptual Model, Anticipated Outcomes and Future Activities

The conceptual model, described below, forms the basis of this monitoring plan, and includes a summary of the project activities, the expected product or output of those activities and the desired project outcomes. Rattlesnake Bluff Road was documented as a major contributor to altered hydrology and impaired water quality, and was among one of the highest priority areas for restoration in the Yellow River basin (Herrington et al., 2010). The utilization of erosion and sediment control practices, including replacement of undersized culverts and stabilization of roadways, will provide increased retention and assimilation of runoff and reduce excessive sediment entering the Yellow River. In addition, targeting restoration of unpaved roads which contribute the greatest and most severe number of impairments will help restore water quality by reducing pollution and hydrologic degradation in small coastal watersheds along the Florida coast.

Table 1.4-1 Conceptual Model

Activity	Output	Short-term Outcome	Long-term Outcome
• Replace undersized culverts at priority stream crossings. • Stabilize roadway.	• Reduced sedimentation.	• Improvements in water quality.	• Higher quality habitat for biological communities in the Yellow River Basin as well as Pensacola Bay.

2 Adaptive Management

Due to the nature of this project, and the use of standard Restoration Techniques that have been used successfully in similar projects, the FL TIG determined that adaptive management is unlikely to be necessary for this project. Direct comparison of data collected prior to and following restoration

activities will allow for adaptive management strategies to be employed if data indicate that project objectives have not been met.

3 Project Monitoring, Performance Criteria, and Potential Corrective Actions

The proposed monitoring for this restoration project was developed to evaluate project performance, key uncertainties, and potential corrective actions, if needed. Information on each monitoring parameter is provided below, organized by objective (Table 3-1). Note that Table 3-1 does not include all possible options for corrective actions; 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.

Table 3-1 Monitoring Parameters

Objectives	Parameter	Purpose	Method	Timing, Frequency, Duration	Sample Size and Sites	Performance Criteria	Potential Corrective Action(s)
1: Reduce pollution and hydrologic degradation to coastal watersheds.	Number of water quality improvement practices implemented	Monitor progress toward meeting the restoration objective	Count of the number of SCMs implemented	Once prior to project implementation and once afterwards to document any changes.	All sites.	N/A.	N/A.
1: Reduce pollution and hydrologic degradation to coastal watersheds.	Area of water quality improvement practices	Monitor progress toward meeting the restoration objective	Aerial imagery or GIS mapping to estimate area.	Once prior to project implementation and once afterwards to document any changes.	All sites.	N/A.	N/A.
2: Reduce excessive sedimentation to the Yellow River via Rattlesnake Bluff Road.	Total suspended solids	Monitor progress toward meeting the restoration objective	Protocols outlined in FDEP SOPs (FDEP 2017 and FWS 2014).	Bi-monthly, six months prior to construction and post construction; and during storm events for one year.	Sample size of 12 each upstream and downstream of site locations.	Reduction TBD, depending on local site conditions.	TBD
2: Reduce excessive sedimentation to the Yellow River via Rattlesnake Bluff Road.	Turbidity	Monitor progress toward meeting the restoration objective	Protocols outlined in FDEP SOPs (FDEP 2017).	Bi-monthly, six months prior to construction; and post construction during storm events for one year.	Sample size of 12 each upstream and downstream of site locations.	Reduction TBD, depending on local site conditions.	TBD

4 Monitoring Schedule

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

Table 4-1 Monitoring Schedule

Monitoring Parameters	Pre-Execution	Post-Execution
Number of water quality improvement practices implemented	X	X
Area of water quality improvement practices	X	X
Total suspended solids	X	X
Turbidity	X	X

5 Evaluation

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

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

6 Data Management

6.1 Data Description

Data collection will occur a week prior to the implementation of the SCMs and during each of the storm events. The data collection will occur at varying locations in the watershed.

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

Relevant Project data that are handwritten on hardcopy datasheets or notebooks will be transcribed (entered) into standard digital format. All field datasheets and notebook entries will be scanned to PDF files. Electronic data files should be named with the date on which the file was created and should include a ReadMe file that describes when the file was created and by whom, and any explanatory notes on the file contents. If a data file is revised, a new copy should be made and the original preserved.

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

6.2 Data Review and Clearance

Relevant Project data that are handwritten on hardcopy datasheets or notebooks will be transcribed (entered) into standard digital format. After transcription of the data, the electronic data sheets will be verified 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 i) entered or converted into agreed upon/commonly used digital format; ii) labeled with metadata following FGDC/ISO standards to the extent practicable and in accordance with Implementing Trustee agency requirements.

After 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 (as described below). Before submitting the monitoring data and information package, co-Implementing Trustees shall confirm with one another that the package is approved for submission.

6.3 Data Storage and Accessibility

Once all data has been QA/QC'ed it will be submitted to the Restoration Portal. Trustees will provide DWH NRDA MAM data and information to the Restoration Portal as soon as possible and no more than one year from when data are collected.

6.4 Data Sharing

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

7 Reporting

Once all data have been reviewed for accuracy and completeness, they will be submitted to the Restoration Portal. Data will be made publicly available through the DIVER Explorer Interface.

8 Roles and Responsibilities

Data will be reviewed and submitted to the Restoration Portal by DOI project personnel.

9 References

FDEP (Florida Department of Environmental Protection). 2017. Standard Operating Procedures. DEP-SOP-001/01. FS 2000 General Aqueous Sampling. Available at: https://floridadep.gov/dear/quality-assurance/content/dep-sops

FWS (U.S. Fish and Wildlife Service). 2014. Panama City Fisheries Resource Office Habitat Evaluation Data Sheet. Field Survey Procedures.

Monitoring and Adaptive Management Plan for *Deepwater Horizon* NRDA Project:

W5, Alligator Lake Coastal Dune Lake Hydrologic Restoration

Prepared by: Nadia Martin (IEc) and FDEP; Draft Version Date: 8/5/2018

1 Introduction

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. Where applicable, it identifies key sources of uncertainty and incorporates monitoring data and decision points that address these uncertainties. As not all projects will have the same sources and degree of uncertainty, this project-specific MAM plan is scaled according to level of uncertainty, scope, scale, and restoration type associated with this project.

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

1.1 Project Overview

This project is being implemented as restoration for the DWH oil spill NRDA, consistent with the PDARP/PEIS.

- Programmatic Goal: Restore Water Quality
- Restoration Type Water Quality
- Restoration Approach: Protect and conserve marine, coastal, estuarine, and riparian habitats
- Restoration Technique: Restore hydrologic connections to enhance coastal habitats
- TIG: FL TIG
- Restoration Plan: Restoration Plan #1

This restoration project would be implemented in Walton County, Florida. The project would reduce pollution and hydrologic degradation to coastal waters within Choctawhatchee Bay Watershed by removing culverts under CR 30A that are in disrepair or do not function. These culverts presently act as barriers separating the north and south portions of the lake rather than allowing the exchange of fresh and Gulf waters. Monitoring efforts for this project would follow existing protocols for water quality monitoring in Walton County that are conducted in cooperation with the Choctawhatchee Basin Alliance (CBA).

The implementing agency is FDEP in coordination with the Walton County Board of County Commissioners.

1.2 Restoration Type Goals and Project Restoration Objectives

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

- Reduce pollutant loadings, including nutrients and pathogens, to priority watersheds along the Florida coast that are threatened by chronic eutrophication, harmful algal blooms, hypoxia, habitat losses, or beach and shellfish closures associated with water quality degradation;
- Mitigate high-volume flows and prevent dramatic shifts in salinity that threaten many coastal habitats and resources along the Gulf Coast;
- Where appropriate, co-locate pollutant reduction projects with other restoration projects to enhance ecological services provided by other restoration approaches (PDARP/PEIS Section 5.5.5.1).

The project restoration objectives are:

- Remove culverts; and
- Restore hydrologic connections to enhance coastal habitats.

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

2 Adaptive Management

Due to the nature of this project, and the use of standard Restoration Techniques that have been used successfully in similar projects, the FL TIG determined that adaptive management is unlikely to be necessary for this project.

3 Project Monitoring, Performance Criteria, and Potential Corrective Actions

The proposed monitoring for this restoration project was developed to evaluate project performance, key uncertainties, and potential corrective actions, if needed. Information on each monitoring parameter is provided below, organized by objective (Table 3-1). Note that Table 3-1 does not include all possible options for corrective actions; 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.

As noted above, monitoring efforts for this project would follow existing protocols for water quality monitoring in Walton County. For additional details on Walton County water quality monitoring, see http://www.basinalliance.org/page.cfm?articleID=4.

Table 3-1 Monitoring Parameters

Objectives	Parameter	Purpose	Method	Timing, Frequency, Duration	Sample Size and Sites	Performance Criteria	Potential Corrective Action(s)
1: Restore hydrologic connections to enhance coastal habitats.	Area of water quality improvement practices	Document area of restoration.	Documentation of estimated area of project influence in sub-basin.	Once post construction	N/A.	95 acres.	N/A.
2: Restore hydrologic connections to enhance coastal habitats.	Temperature	Document change in parameter due to removal of flow restriction	Standard approaches utilized by Walton Co. volunteers, the Quanta Hydrolab Water Quality Monitoring System	Monthly at each site.	All sites.	N/A.	N/A.
2: Restore hydrologic connections to enhance coastal habitats.	DO	Document change in parameter due to removal of flow restriction	Standard approaches utilized by Walton Co. volunteers, the Quanta Hydrolab Water Quality Monitoring System	Monthly at each site.	All sites.	N/A.	N/A.
2: Restore hydrologic connections to enhance coastal habitats.	pH	Document change in parameter due to removal of flow restriction	Standard approaches utilized by Walton Co. volunteers, the Quanta Hydrolab Water Quality Monitoring System	Monthly at each site.	All sites.	N/A.	N/A.
2: Restore hydrologic connections to enhance coastal habitats.	Salinity	Document change in parameter due to removal of flow restriction	Standard approaches utilized by Walton Co. volunteers, the Quanta Hydrolab Water Quality Monitoring System	Monthly at each site.	All sites.	N/A.	N/A.
2: Restore hydrologic connections to enhance coastal habitats.	Total nitrogen (TN)	Document change in parameter due to removal of flow restriction	Standard approaches utilized by Walton Co. volunteers, water sample collected and sent to Florida LAKEWATCH program	Monthly at each site.	All sites.	N/A.	N/A.
2: Restore hydrologic connections to enhance coastal habitats.	Total phosphorus (TP)	Document change in parameter due to removal of flow restriction	Standard approaches utilized by Walton Co. volunteers, water sample collected and sent to Florida LAKEWATCH program	Monthly at each site.	All sites.	N/A.	N/A.
2: Restore hydrologic connections to enhance coastal habitats.	Total Chlorophyll	Document change in parameter due to removal of flow restriction	Standard approaches utilized by Walton Co. volunteers, water sample collected and sent to Florida LAKEWATCH program	Monthly at each site.	All sites.	N/A.	N/A.

4 Monitoring Schedule

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

Table 4-1 Monitoring Schedule

Monitoring Parameters	Pre-Execution	Post-Execution
Number of water quality improvement practices implemented	N/A	X
Area of water quality improvement practices	N/A	X
Temperature	N/A	X
DO	N/A	X
pH	N/A	X
Salinity	N/A	X
Total nitrogen (TN)	N/A	X
Total phosphorus (TP)	N/A	X
Total ChlorophyII	N/A	X

5 Evaluation

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

- *Were the project restoration objectives achieved? If not, is there a reason why they were not met?* For example, the FL TIG anticipates comparing pre-project execution conditions such as salinity, to determine if performance criteria have been met.
- *Did the restoration project produce unanticipated effects?* The FL TIG anticipates keeping track of unanticipated effects, as applicable, to help with future restoration planning efforts.
- *Were there unanticipated events unrelated to the restoration project that potentially affected the monitoring results (e.g., hurricanes)?* The FL TIG anticipates keeping track of any unanticipated events, such as unusual climatic conditions, and using that information to determine whether the event impacted the restoration project or monitoring results.
- *Were any of the uncertainties identified prior to project implementation resolved?* The FL TIG would determine whether uncertainties were identified prior to the project, and if not, how these uncertainties may be identified prior to future restoration projects to help improve likelihood of success.
- *Were any new uncertainties identified?*

6 Data Management

6.1 Data Description

All data collected, analyzed, and reported will comply with the Chapter 62-160, Florida Administrative Code (F.A.C.), Quality Assurance, which is the FDEP rule that specifies the minimum field and laboratory quality assurance, methodology, reporting, auditing and data usability requirements for environmental data measurements for DEP programs.

To the extent practicable, all environmental data generated during monitoring activities will be documented using standardized field datasheets. If standardized datasheets are unavailable or not

readily amendable to record project-specific data, then project-specific datasheets will be drafted prior to conducting any project monitoring activities. Original hardcopy datasheets and notebooks and photographs will be retained by the Implementing Trustee.

Relevant project data that are handwritten on hardcopy datasheets or notebooks will be transcribed (entered) into standard digital format. All field datasheets and notebook entries will be scanned to PDF files. Electronic data files should be named with the date on which the file was created and should include a ReadMe file that describes when the file was created and by whom, and any explanatory notes on the file contents. If a data file is revised, a new copy should be made and the original preserved.

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

6.2 Data Review and Clearance

Relevant project data that are handwritten on hardcopy datasheets or notebooks will be transcribed (entered) into standard digital format. After transcription of the data, the electronic data sheets will be verified 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 are: i) entered or converted into agreed upon/commonly used digital format; ii) labeled with metadata following FGDC/ISO standards to the extent practicable and in accordance with Implementing Trustee agency requirements.

After 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 (as described below). Before submitting the monitoring data and information package, co-Implementing Trustees shall confirm with one another that the package is approved for submission.

6.3 Data Storage and Accessibility

Once all data has been QA/QC'ed it will be submitted to the Restoration Portal. Trustees will provide DWH NRDA MAM data and information to the Restoration Portal as soon as possible and no more than one year from when data are collected.

CBA currently houses water quality data in the Water Quality Portal.[1] All of the data collected through 2015 is available in the portal. CBA is working to adjust the format of the data to be compatible with the Florida Watershed Information Network data management platform to allow for data publication in the Water Quality Portal moving forward.

[1] https://www.epa.gov/waterdata/water-quality-data-wqx

6.4 Data Sharing

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

7 Reporting

All reporting would occur after monitoring data collection efforts are complete. CBA provides annual reports to Walton County in June. The report would summarize the findings for the sampling period including all worksheets transferred into digital format and presented in tabular and graphical formats.

8 Roles and Responsibilities

Data will be reviewed and submitted to the Restoration Portal by FDEP project personnel.

Monitoring and Adaptive Management Plan for *Deepwater Horizon* NRDA Project:

WQ8, City of Port St. Joe Stormwater Improvements

Prepared by: Nadia Martin (IEc) and FDEP; Draft Version Date: 8/5/2018

1 Introduction

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. Where applicable, it identifies key sources of uncertainty and incorporates monitoring data and decision points that address these uncertainties. As not all projects will have the same sources and degree of uncertainty, this project-specific MAM plan is scaled according to level of uncertainty, scope, scale, and restoration type associated with this project.

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

1.1 Project Overview

This project is being implemented as restoration for the DWH oil spill NRDA, consistent with the PDARP/PEIS.

- Programmatic Goal: Restore Water Quality
- Restoration Type: Water Quality
- Restoration Approach: Reduce pollution and hydrologic degradation to coastal watersheds
- Restoration Technique: Traditional stormwater control measures
- TIG: FL TIG
- Restoration Plan: Restoration Plan #1

This restoration project would be implemented within the City of Port St. Joe, Florida. Restoration activities include the engineering and design of traditional stormwater control measures (SCMs) and improvements to the existing conveyance system. Another objective of the project is to develop a stormwater master plan for the City of Port St. Joe, and the restoration actions and monitoring activities would help inform this master plan. SCMs are planned for a sub-basin covering approximately 280 acres draining to Patton Bayou and St. Joseph Bay. The project would include construction of approximately 2.5 acres of retrofit treatment pond area near 16th Street with an additional downstream outfall weir added to provide stormwater treatment capacity and improve water quality protection for St. Joseph Bay.

The implementing agency is FDEP. The partner agencies include the NWFWMD and the City of Port St. Joe.

1.2 Restoration Type Goals and Project Restoration Objectives

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

- Reduce pollutant loadings, including nutrients and pathogens, to priority watersheds along the Florida coast that are threatened by chronic eutrophication, harmful algal blooms, hypoxia, habitat losses, or beach and shellfish closures associated with water quality degradation;
- Mitigate high-volume flows and prevent dramatic shifts in salinity that threaten many coastal habitats and resources along the Gulf Coast;
- Where appropriate, co-locate pollutant reduction projects with other restoration projects to enhance ecological services provided by other restoration approaches (PDARP/PEIS Section 5.5.5.1).

The project restoration objectives are:

- Engineer and construct traditional SCMs and improvements within an existing conveyance system in the St. Joseph Bay watershed;
- Reduce pollutant loadings to specified performance criteria to improve water quality in the St. Joseph Bay watershed.

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

2 Adaptive Management

Due to the nature of this project, and the use of standard Restoration Techniques that have been used successfully in similar projects, the FL TIG determined that adaptive management is unlikely to be necessary for this project. However, monitoring would be conducted, as described in Section 3, below. If the SCMs do not meet the stated performance criteria, potential corrective actions include the installation of additional SCMs, such as upstream baffle boxes, or additional littoral plantings within the pond to increase pollutant uptake. Additionally, the monitoring data collected and evaluated for this project component would be used in the development of the stormwater master plan for the City of St. Joe.

3 Project Monitoring, Performance Criteria, and Potential Corrective Actions

The proposed monitoring for this restoration project was developed to evaluate project performance, key uncertainties, and potential corrective actions, if needed. Information on each monitoring parameter is provided below, organized by objective (Table 3-1). Note that Table 3-1 does not include all possible options for corrective actions; 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.

Table 3-1 Monitoring Parameters

Objectives	Parameter	Purpose	Method	Timing, Frequency, Duration	Sample Size and Sites	Performance Criteria	Potential Corrective Action(s)
1: Engineer and construct traditional SCMs and improvements within an existing conveyance system in the St. Joseph Bay watershed.	Infrastructure constructed and/or enhanced and completed as designed	Monitor progress (determine if SCMs are constructed as designed)	Review of as-built drawings and Professional Engineer Certification of Completion of Construction.	Once post construction.	N/A.	SCMs constructed are in substantial conformance with approved plans.	Reconstruct SCMs to be in substantial conformance with approved plans.
2: Reduce pollutant loadings to target levels and improve water quality in the St. Joseph Bay watershed.	Number of water quality improvement practices implemented	Document restoration actions	Count of the number of SCMs implemented.	Once after project execution is complete.	All SCMs implemented; all sites.	1.	N/A.
2: Reduce pollutant loadings to target levels and improve water quality in the St. Joseph Bay watershed.	Area of water quality improvement practices	Document area of restoration	Documentation of estimated area of project influence in sub-basin.	Once post construction.	N/A.	N/A.	N/A.
2: Reduce pollutant loadings to target levels and improve water quality in the St. Joseph Bay watershed.	Daily rainfall	Determine if rainfall sufficient for sampling	Automated rain gauge, with verification from the local weather station.	Daily until 7-10 suitable storm events are sampled.	One site near constructed SCMs.	Suitable rain events for monitoring generally consist of greater than 0.20 inches and less than 1.5 inches of rain.	Adjust duration of sampling for a sufficient number (7-10) of sampling events
2: Reduce pollutant loadings to target levels and improve water quality in the St. Joseph Bay watershed.	Flow	Help measure pollutant loadings (used along with concentrations)	Approved flow activated flow meters.	7-10 storm events.	Inflows and outflows for each storm event from SCMs constructed.	N/A.	Repair or replace flow meters.
2: Reduce pollutant loadings to target levels and improve water quality in the St. Joseph Bay	Total nitrogen (TN)	Monitor progress in reducing pollutant loadings	Flow weighted composite samples taken over the storm hydrograph.	7-10 storm events; typically, the samples will be composited over the inflow hydrograph at the inflow and for up to a 36-	Inflows and outflows for each storm event from SCMs constructed; each composite	Average of 25% reduction in pollutant loading (inflow versus outflow) over the 7-	Potential actions would vary depending on deviation from specified performance criteria, but could include baffle

Objectives	Parameter	Purpose	Method	Timing, Frequency, Duration	Sample Size and Sites	Performance Criteria	Potential Corrective Action(s)
watershed.				hour period at outflow station, depending upon the time of concentration and flow into and out of the SCM.	would include at least 6 evenly distributed sub-samples.	10 storm events monitored.	boxes, or additional plantings within the pond to increase pollutant removals.
2: Reduce pollutant loadings to target levels and improve water quality in the St. Joseph Bay watershed.	Total phosphorus (TP)	Monitor progress in reducing pollutant loadings	Flow weighted composite samples taken over the storm hydrograph.	7-10 storm events; typically, the samples would be composited over the inflow hydrograph at the inflow and for up to a 36-hour period at outflow station, depending upon the time of concentration and flow into and out of the SCM.	Inflows and outflows for each storm event from SCMs constructed; each composite would include at least 6 evenly distributed sub-samples.	Average of 50% reduction in pollutant loading (inflow versus outflow) over the 7-10 storm events monitored.	Potential actions would vary depending on deviation from specified performance criteria, but could include baffle boxes, or additional plantings within the pond to increase pollutant removals.

Monitoring for this project would include sampling from seven to ten storm events. If possible, monitored events would be discrete rainfall events generally consisting of greater than 0.20 inches and less than 1.5 inches of rain. However, this would depend on field conditions and storm events; actual rainfall may vary as well as the drainage area, amount of impervious area, and time of concentration. Monitoring would generally be conducted at two locations: inflows and outflows.

4 Monitoring Schedule

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

Table 4-1 Monitoring Schedule

Monitoring Parameters	Pre-Execution	Post-Execution[1]
Infrastructure constructed and/or enhanced and completed as designed	N/A	X
Number of water quality improvement practices implemented	N/A	X
Area of water quality improvement practices	N/A	X
Daily rainfall	N/A	X
Flow	N/A	X
Total nitrogen (TN)	N/A	X
Total phosphorus (TP)	N/A	X
[1] Schedule for post-execution monitoring would depend on rainfall and storm events.		

5 Evaluation

As-built drawings would be compared to approved design drawings to determine the magnitude of any deviations from the approved plans. SCMs, total nitrogen and total phosphorus input and output loadings would be determined from the monitoring results and averaged over the 7-10 storm events to determine the percent reduction of pollutants across the SCMs. The calculated average percent reductions would be compared with the specified performance criteria.

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

- *Were the project restoration objectives achieved? If not, is there a reason why they were not met?* For example, the FL TIG anticipates comparing inflow and outflow data to determine whether water quality (including TN and TP levels) performance criteria has been met.
- *Did the restoration project produce unanticipated effects?* The FL TIG anticipates keeping track of unanticipated effects, as applicable, to help with future restoration planning efforts.
- *Were there unanticipated events unrelated to the restoration project that potentially affected the monitoring results (e.g., hurricanes)?* The FL TIG anticipates keeping track of any unanticipated events, such as unusual climatic conditions, and using that information to determine whether the event impacted the restoration project or monitoring results.
- *Were any of the uncertainties identified prior to project implementation resolved?* The FL TIG would determine whether uncertainties were identified prior to the project, and if not, how these uncertainties may be identified prior to future restoration projects to help improve

likelihood of success.

- *Were any new uncertainties identified?*

6 Data Management

6.1 Data Description

All data collected, analyzed, and reported will comply with the Chapter 62-160, Florida Administrative Code (F.A.C.), Quality Assurance, which is the FDEP rule that specifies the minimum field and laboratory quality assurance, methodology, reporting, auditing and data usability requirements for environmental data measurements for DEP programs.

Rainfall data collection will occur after implementation of the SCMs, and water quality will be sampled during each of the storm events. Rainfall data collection will occur at a site near the constructed SCMs and the flow-weighted water quality samples will be collected at suitable SCMs input and output location.

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

Relevant Project data that are handwritten on hardcopy datasheets or notebooks will be transcribed (entered) into standard digital format. All field datasheets and notebook entries will be scanned to PDF files. Electronic data files should be named with the date on which the file was created and should include a ReadMe file that describes when the file was created and by whom, and any explanatory notes on the file contents. If a data file is revised, a new copy should be made and the original preserved.

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

6.2 Data Review and Clearance

Relevant Project data that are handwritten on hardcopy datasheets or notebooks will be transcribed (entered) into standard digital format. After transcription of the data, the electronic data sheets will be verified 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 i) entered or converted into agreed upon/commonly used digital format; ii) labeled with metadata following FGDC/ISO standards to the extent practicable and in accordance with Implementing Trustee agency requirements.

After 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 (as described below). Before submitting the monitoring data and information package, co-Implementing Trustees shall confirm with one another that the package is approved for submission.

6.3 Data Storage and Accessibility

Once all data has been QA/QC'ed it will be submitted to the Restoration Portal. Trustees will provide DWH NRDA MAM data and information to the Restoration Portal as soon as possible and no more than one year from when data are collected.

6.4 Data Sharing

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

7 Reporting

Once all data have been reviewed for accuracy and completeness, they will be submitted to the Restoration Portal. Data will be made publicly available through the DIVER Explorer Interface.

8 Roles and Responsibilities

Data will be reviewed and submitted to the Restoration Portal by FDEP project personnel.

Monitoring and Adaptive Management Plan for *Deepwater Horizon* NRDA Project:

WQ10, City of Carrabelle's Lighthouse Estates: Septic Tank Abatement - Phase II

Prepared by: Nadia Martin (IEc) and FDEP; Draft Version Date: 8/5/2018

1 Introduction

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. Where applicable, it identifies key sources of uncertainty and incorporates monitoring data and decision points that address these uncertainties. As not all projects will have the same sources and degree of uncertainty, this project-specific MAM plan is scaled according to level of uncertainty, scope, scale, and restoration type associated with this project.

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

1.1 Project Overview

This project is being implemented as restoration for the DWH oil spill NRDA, consistent with the PDARP/PEIS.

- Programmatic Goal: Restore Water Quality
- Restoration Type Water Quality
- Restoration Approach: Reduce pollution and hydrologic degradation to coastal watersheds
- Restoration Technique: Septic tank abandonment and connection of homes to regional sewage collection system
- TIG: FL TIG
- Restoration Plan: Restoration Plan #1

This restoration project would be implemented southwest of the City of Carrabelle, Franklin County, Florida. The project aims to improve water quality in Apalachicola Bay and St. George Sound by connecting homes near the bay currently served by septic systems to a central wastewater treatment system.

The implementing agency is FDEP. The other partner agency is City of Carrabelle and NWFWMD.

1.2 Restoration Type Goals and Project Restoration Objectives

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

- Reduce pollutant loadings, including nutrients and pathogens, to priority watersheds along the Florida coast that are threatened by chronic eutrophication, harmful algal blooms, hypoxia, habitat losses, or beach and shellfish closures associated with water quality degradation;
- Mitigate high-volume flows and prevent dramatic shifts in salinity that threaten many coastal habitats and resources along the Gulf Coast;
- Where appropriate, co-locate pollutant reduction projects with other restoration projects to enhance ecological services provided by other restoration approaches (PDARP/PEIS Section 5.5.5.1).

The project restoration objectives are:

- Reduce pollution to coastal watersheds.
- Reduce pathogen concentrations and/or exposures.

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

2 Adaptive Management

Due to the nature of this project, and the use of standard approaches and Restoration Techniques that have been successfully implemented in similar projects, the FL TIG does not anticipate the need for rigorous adaptive management of the project. If project objectives are not being met, the FL TIG will identify corrective actions as necessary.

3 Project Monitoring, Performance Criteria, and Potential Corrective Actions

The proposed monitoring plan for this restoration project was developed to evaluate project performance, key uncertainties, and potential corrective actions, if needed. For additional details on the sampling efforts at Carrabelle Beach, see the Florida Healthy Beaches Program website.[2]

The proposed monitoring for this restoration project was developed to evaluate project performance, key uncertainties, and potential corrective actions, if needed. Information on each monitoring parameter is provided below, organized by objective (Table 3-1). Note that Table 3-1 does not include all possible options for corrective actions; 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.

[2] *http://www.floridahealth.gov/environmental-health/beach-water-quality/beach-detail.html?County=Franklin&SPLocation=CARRABELLE%20BEACH&SPNo=&SPLat=29.82905455&SPLong=-84.69273643* and for additional details see: *http://www.floridahealth.gov/environmental-health/beach-water-quality/index.html*

Table 3-1 Monitoring Parameters

Objectives	Parameter	Purpose	Method	Timing, Frequency, Duration	Sample Size and Sites	Performance Criteria	Potential Corrective Action(s)
1: Reduce pollution and hydrologic degradation to coastal watersheds.	Number of water quality improvement practices implemented	Document restoration actions.	Count of the number of homes connected to central wastewater treatment.	Once after project execution is complete.	N/A.	110 OSTDs removed.	N/A.
1: Reduce pollution and hydrologic degradation to coastal watersheds.	Area of water quality improvement practices	Document area of restoration.	Documentation of estimated area of project influence.	Once post project completion.	N/A.	Approximate area of subdivision (900 acres).	N/A.
2: Reduce pathogen concentrations and/or exposures.	Enterococci	Monitor progress toward meeting the restoration objective	Per FDEP protocols (e.g., see IDEXX Enterolert; Baird et al. 2017, EPA 2017)	Two per month.	Carrabelle Beach	Reduce number of moderate and poor sample results.	N/A.

4 Monitoring Schedule

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

Table 4-1 Monitoring Schedule

Monitoring Parameters	Pre-Execution	Post-Execution
Number of water quality improvement practices implemented	N/A	X
Area of water quality improvement practices	N/A	X
Enterococci	X	X

5 Evaluation

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

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

6 Data Management

6.1 Data Description

This project will use sample results from the Florida Department of Health (FDOH) *Florida Healthy Beaches Program* – see http://www.floridahealth.gov/environmental-health/beach-water-quality/index.html

This project will use sample results from the Carrabelle Beach sampling station, nearby to the Lighthouse Estates subdivision and the closest beach swimming area. Samples are collected at least twice per month. Sample results are reported as Enterococci per 100 milliliters of marine water.

Sample results are then categorized as good, moderate, or poor as follows:

Good = 0-35 Enterococci per 100 milliliters of marine water

Moderate = 36-70 Enterococci per 100 milliliters of marine water

Poor = 71 or greater Enterococci per 100 milliliters of marine water

The FL TIG will rely on the results presented from the DOH website to compare the frequency of moderate and poor sampling results pre-project to those post-project implementation.

6.2 Data Review and Clearance

After transcription of the data into the summary reports, the data in the summary reports will be verified against the DOH website data, 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 are: i) entered or converted into agreed upon/commonly used digital format; ii) labeled with metadata following FGDC/ISO standards to the extent practicable and in accordance with Implementing Trustee agency requirements.

After 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 (as described below). Before submitting the monitoring data and information package, co-Implementing Trustees shall confirm with one another that the package is approved for submission.

6.3 Data Storage and Accessibility

Once all data have been QA/QC'ed, they will be submitted to the Restoration Portal. Trustees will provide DWH NRDA MAM data and information to the Restoration Portal as soon as possible and no more than one year from when data are collected.

6.4 Data Sharing

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

7 Reporting

Summary reports will be prepared from the sample results from the DOH website. The summary reports would include summaries of the findings for the reporting period, presented in narrative, tabular and graphical formats.

8 Roles and Responsibilities

Data will be reviewed and submitted to the Restoration Portal by FDEP project personnel.

9 References

Baird, E.W., A.D. Eaton, and E.W. Rice. 2017. *Standard Methods for the Examination of Water and Wastewater, 23rd Edition*. American Public Health Association, American Water Works Association, and Water Environmental Federation.

EPA (United States Environmental Protection Agency). 2017. Clean Water Act Methods Update Rule – Final Rule. Table 1H – List of Approved Microbiological Methods for Ambient Water. Federal Register, Vol. 82, No. 165, August 28. pp. 40867–408768.

Monitoring and Adaptive Management Plan for *Deepwater Horizon* NRDA Project:

REC3, Perdido River and Bay Paddle Trail

Prepared by: Nadia Martin (IEc) and FDEP; Draft Version Date: 8/5/2018

1 Introduction

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. Where applicable, it identifies key sources of uncertainty and incorporates monitoring data and decision points that address these uncertainties. As not all projects will have the same sources and degree of uncertainty, this project-specific MAM plan is scaled according to level of uncertainty, scope, scale, and restoration type associated with this project.

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

1.1 Project Overview

This project is being implemented as restoration for the DWH oil spill NRDA, consistent with the PDARP/PEIS.

- Programmatic Goal: Provide and Enhance Recreational Opportunities
- Restoration Type: Provide and Enhance Recreational Opportunities
- Restoration Approach: Enhance public access to natural resources for recreational use
- Restoration Technique: Construction or enhancement of recreational infrastructure
- TIG: FL TIG
- Restoration Plan: Restoration Plan #1

This restoration project would be implemented at multiple sites along the Perdido River, Escambia County, Florida. The project includes actions to provide and enhance recreational opportunities along Perdido River by constructing additional recreational access and amenities at multiple locations along the Florida side of the river. This project is intended to enhance public access by providing access to recreational areas with no existing recreational access (i.e., Heron Bayou), by providing improved water access amenities (i.e., shelters), and by providing water access in a location with no current public access (i.e., Heron Bayou).

The implementing agency is FDEP. The partner agencies include the Nature Conservancy (TNC, Florida), Northwest Florida Water Management District (NWFWMD), and Escambia County.

1.2 Restoration Type Goals and Project Restoration Objectives

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

- Increase recreational opportunities such as fishing, beach-going, camping, and boating with a combination of ecological restoration and creation of infrastructure, access, and use opportunities (PDARP/PEIS Section 5.5.14.1).

The project restoration objectives are:

- Provide and enhance recreational access along the Perdido River by constructing shelters, paddle-craft access, and kiosks; and constructing an entrance drive, shelter, and parking area at Heron Bayou.

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

2 Adaptive Management

Due to the nature of this project, and the use of standard Restoration Techniques that have been successfully implemented in similar projects, the FL TIG the FL TIG does not anticipate the need for rigorous adaptive management of the project. If project objectives are not being met, the FL TIG will identify corrective actions as necessary.

3 Project Monitoring, Performance Criteria, and Potential Corrective Actions

The proposed monitoring for this restoration project was developed to evaluate project performance, key uncertainties, and potential corrective actions, if needed. Information on each monitoring parameter is provided below, organized by objective (Table 3-1). Note that Table 3-1 does not include all possible options for corrective actions; 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.

Table 3-1 Monitoring Parameters

Objective 1: Provide and enhance recreational access within the Perdido River Preserve by constructing shelters and kiosks, and enhancing an entrance and parking area at Heron Bayou.

Parameter	Purpose	Method	Timing, Frequency, Duration	Sample Size and Sites	Performance Criteria	Potential Corrective Action(s)
Visitor use/access	Monitor progress toward meeting the restoration objective.	Direct observations, including staff observations on-site using hand counters or recording forms, camera recordings, remote sensing, or	Post construction, visual observations would be conducted 3 hours per quarter for 12 months.	4 times (once per quarter for the first year following completion of construction) at the Heron	Members of the public are able to use the constructed amenities.	N/A.

Parameter	Purpose	Method	Timing, Frequency, Duration	Sample Size and Sites	Performance Criteria	Potential Corrective Action(s)
		aerial surveys.		Bayou site.		
Infrastructure constructed and/or enhanced and completed as designed	Monitor progress toward meeting the restoration objective.	Review of contractor reports, on-site inspections, and comparison of construction to "as-built" drawings or other planning materials.	Approximately monthly during construction and at the end of construction warranty period, unless otherwise provided by contract.	At locations of constructed amenities; approximately 12 times (monthly for 12 months of construction, or as necessary).	The shelters and other amenities are constructed and completed as designed and specified in the construction contract.	Resolution with contractor such that the terms of the contract are met.

4 Monitoring Schedule

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

Table 4-1 Monitoring Schedule

Monitoring Parameters	Pre-Execution Monitoring	Execution Monitoring (as-built)	Post-Execution Monitoring
Visitor use/access	N/A	N/A	X
Infrastructure constructed and/or enhanced and completed as designed	N/A	X	

5 Evaluation

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

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

6 Data Management

6.1 Data Description

Data collection will occur during construction and post construction and will be compiled within 12 months after collection. The data collection will occur at the Heron Bayou site.

To the extent practicable, all visitor use data generated during monitoring activities will be documented using standardized field datasheets. If standardized datasheets are unavailable or not readily amendable

to record Project-specific data, then Project-specific datasheets will be drafted prior to conducting any Project monitoring activities. Original hardcopy datasheets and notebooks and photographs will be retained by the Implementing Trustee.

Relevant Project data that are handwritten on hardcopy datasheets or notebooks will be transcribed (entered) into standard digital format. All field datasheets and notebook entries will be scanned to PDF files. Electronic data files should be named with the date on which the file was created and should include a ReadMe file that describes when the file was created and by whom, and any explanatory notes on the file contents. If a data file is revised, a new copy should be made and the original preserved.

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

6.2 Data Review and Clearance

Relevant Project data that are handwritten on hardcopy datasheets or notebooks will be transcribed (entered) into standard digital format. After transcription of the data, the electronic data sheets will be verified 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 i) entered or converted into agreed upon/commonly used digital format; ii) labeled with metadata following FGDC/ISO standards to the extent practicable and in accordance with Implementing Trustee agency requirements.

After 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 (as described below). Before submitting the monitoring data and information package, co-Implementing Trustees shall confirm with one another that the package is approved for submission.

6.3 Data Storage and Accessibility

Once all data has been QA/QC'ed it will be submitted to the Restoration Portal. Trustees will provide DWH NRDA MAM data and information to the Restoration Portal as soon as possible and no more than one year from when data are collected.

6.4 Data Sharing

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

7 Reporting

Once all data have been reviewed for accuracy and completeness, they will be submitted to the Restoration Portal. Data will be made publicly available through the DIVER Explorer Interface.

8 Roles and Responsibilities

Data will be reviewed and submitted to the Restoration Portal by FDEP project personnel.

Monitoring and Adaptive Management Plan for *Deepwater Horizon* NRDA Project:

REC4, Carpenter Creek Headwaters Park Amenities

Prepared by: Nadia Martin (IEc) and FDEP; Draft Version Date: 8/5/2018

1 Introduction

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. Where applicable, it identifies key sources of uncertainty and incorporates monitoring data and decision points that address these uncertainties. As not all projects will have the same sources and degree of uncertainty, this project-specific MAM plan is scaled according to level of uncertainty, scope, scale, and restoration type associated with this project.

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

1.1 Project Overview

This project is being implemented as restoration for the DWH oil spill NRDA, consistent with the PDARP/PEIS.

- Programmatic Goal: Provide and Enhance Recreational Opportunities
- Restoration Type: Provide and Enhance Recreational Opportunities
- Restoration Approach: Enhance public access to natural resources for recreational use
- Restoration Technique: Construction or enhancement of recreational infrastructure
- TIG: FL TIG
- Restoration Plan: Restoration Plan #1

This restoration project would be implemented within the City of Pensacola, Escambia County, Florida. This project involves the construction of a public park at the headwaters of Carpenter Creek which includes a trail, paddle-craft launch, passive recreation area, parking area, and educational signage. This project is intended to provide and enhance public access to recreational opportunities by providing a new recreational opportunity in an area with no current recreational access.

The implementing agency is FDEP in coordination with Escambia County Natural Resources Management Division. Other project partners include the City of Pensacola, Pensacola and Perdido Bays Estuary Program, Emerald Coastkeeper, UWF, Bayou Texar Foundation, UF IFAS Extension, Washington High School Marine Science Academy, Bream Fishermen Association, and the Audubon Society (Florida Chapter).

1.2 Restoration Type Goals and Project Restoration Objectives

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

- Increase recreational opportunities such as fishing, beach-going, camping, and boating with a combination of ecological restoration and creation of infrastructure, access, and use opportunities (PDARP/PEIS Section 5.5.14.1).

The project restoration objectives are:

- Provide and enhance recreational access in Escambia County through the construction of a public park at the headwaters of Carpenter Creek.

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

2 Adaptive Management

Due to the nature of this project, and the use of standard Restoration Techniques that have been successfully implemented in similar projects, the FL TIG the FL TIG does not anticipate the need for rigorous adaptive management of the project. If project objectives are not being met, the FL TIG will identify corrective actions as necessary.

3 Project Monitoring, Performance Criteria, and Potential Corrective Actions

The proposed monitoring for this restoration project was developed to evaluate project performance, key uncertainties, and potential corrective actions, if needed. Information on each monitoring parameter is provided below, organized by objective (Table 3-1). Note that Table 3-1 does not include all possible options for corrective actions; 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.

Table 3-1 Monitoring Parameters

Objective 1: Provide and enhance recreational access in Escambia County through the construction of a public park at the headwaters of Carpenter Creek.

Parameter	Purpose	Method	Timing, Frequency, Duration	Sample Size and Sites	Performance Criteria	Potential Corrective Action(s)
Visitor use/access	Monitor progress toward meeting the restoration objective.	Direct observations, including staff observations on-site using hand counters or recording forms, camera recordings, remote sensing, or aerial surveys.	Post construction, visual observations would be conducted 3 hours per quarter for 12 months.	4 times (once per quarter for the first year following completion of construction) at the Heron Bayou site.	Members of the public are able to use the constructed amenities.	N/A.

Parameter	Purpose	Method	Timing, Frequency, Duration	Sample Size and Sites	Performance Criteria	Potential Corrective Action(s)
Infrastructure constructed and/or enhanced and completed as designed	Monitor progress toward meeting the restoration objective.	Review of contractor reports, on-site inspections, and comparison of construction to "as-built" drawings or other planning materials.	Approximately monthly during construction and at the end of construction warranty period, unless otherwise provided by contract.	At locations of constructed amenities; approximately 12 times (monthly for 12 months of construction, or as necessary).	The shelters and other amenities are constructed and completed as designed and specified in the construction contract.	Resolution with contractor such that the terms of the contract are met.

4 Monitoring Schedule

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

Table 4-1 Monitoring Schedule

Monitoring Parameters	Pre-Execution Monitoring	Execution Monitoring (as-built)	Post-Execution Monitoring
Visitor use/access	N/A	N/A	X
Infrastructure constructed and/or enhanced and completed as designed	N/A	X	

5 Evaluation

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

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

6 Data Management

6.1 Data Description

Data collection will occur during construction and post construction and will be compiled within 12 months after collection. The data collection will occur within the Park.

To the extent practicable, all visitor use data generated during monitoring activities will be documented using standardized field datasheets. If standardized datasheets are unavailable or not readily amendable to record Project-specific data, then Project-specific datasheets will be drafted prior to conducting any

Project monitoring activities. Original hardcopy datasheets and notebooks and photographs will be retained by the Implementing Trustee.

Relevant Project data that are handwritten on hardcopy datasheets or notebooks will be transcribed (entered) into standard digital format. All field datasheets and notebook entries will be scanned to PDF files. Electronic data files should be named with the date on which the file was created and should include a ReadMe file that describes when the file was created and by whom, and any explanatory notes on the file contents. If a data file is revised, a new copy should be made and the original preserved.

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

6.2 Data Review and Clearance

Relevant Project data that are handwritten on hardcopy datasheets or notebooks will be transcribed (entered) into standard digital format. After transcription of the data, the electronic data sheets will be verified 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 i) entered or converted into agreed upon/commonly used digital format; ii) labeled with metadata following FGDC/ISO standards to the extent practicable and in accordance with Implementing Trustee agency requirements.

After 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 (as described below). Before submitting the monitoring data and information package, co-Implementing Trustees shall confirm with one another that the package is approved for submission.

6.3 Data Storage and Accessibility

Once all data has been QA/QC'ed it will be submitted to the Restoration Portal. Trustees will provide DWH NRDA MAM data and information to the Restoration Portal as soon as possible and no more than one year from when data are collected.

6.4 Data Sharing

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

7 Reporting

Once all data have been reviewed for accuracy and completeness, they will be submitted to the Restoration Portal. Data will be made publicly available through the DIVER Explorer Interface.

8 Roles and Responsibilities

Data will be reviewed and submitted to the Restoration Portal by FDEP project personnel.

Monitoring and Adaptive Management Plan for *Deepwater Horizon* NRDA Project:

REC5, Gulf Islands National Seashore (Florida) Rehabilitation of Okaloosa Unit Recreational Facilities

Prepared by: Nadia Martin (IEc) and DOI; Draft Version Date: 8/5/2018

1 Introduction

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. Where applicable, it identifies key sources of uncertainty and incorporates monitoring data and decision points that address these uncertainties. As not all projects will have the same sources and degree of uncertainty, this project-specific MAM plan is scaled according to level of uncertainty, scope, scale, and restoration type associated with this project.

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

1.1 Project Overview

This project is being implemented as restoration for the DWH oil spill NRDA, consistent with the PDARP/PEIS.

- Programmatic Goal: Provide and Enhance Recreational Opportunities
- Restoration Type: Provide and Enhance Recreational Opportunities
- Restoration Approach: Enhance public access to natural resources for recreational use
- Restoration Technique: Construction or enhancement of recreational infrastructure
- TIG: FL TIG
- Restoration Plan: Restoration Plan #1

This restoration project would be implemented within the Gulf Islands National Seashore (GUIS), Florida District, Okaloosa County. This project would include rehabilitation of recreational facilities at the Okaloosa Unit of GUIS including constructing a boat ramp, floating pier, restroom, lift station, electrical systems, parking area, RV sites, picnic areas, gates, boardwalks, fencing, and would include re-vegetation efforts. This project is intended to enhance recreational activities such as swimming, boating, diving, bird watching, beach-going, and fishing.

The implementing agency is DOI in coordination with NPS and GUIS staff.

1.2 Restoration Type Goals and Project Restoration Objectives

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

- Increase recreational opportunities such as fishing, beach-going, camping, and boating with a combination of ecological restoration and creation of infrastructure, access, and use opportunities (PDARP/PEIS Section 5.5.14.1).

The project restoration objectives are:

- Provide and enhance recreational access and opportunities at GUIS, Okaloosa Unit, through the construction of park amenities and enhancement of the entrance and parking areas.

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

2 Adaptive Management

Due to the nature of this project, and the use of standard Restoration Techniques that have been successfully implemented in similar projects, the FL TIG the FL TIG does not anticipate the need for rigorous adaptive management of the project. If project objectives are not being met, the FL TIG will identify corrective actions as necessary.

3 Project Monitoring, Performance Criteria, and Potential Corrective Actions

The proposed monitoring for this restoration project was developed to evaluate project performance, key uncertainties, and potential corrective actions, if needed. Information on each monitoring parameter is provided below, organized by objective (Table 3-1). Note that Table 3-1 does not include all possible options for corrective actions; 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.

Table 3-1 Monitoring Parameters

Objective 1: Provide and enhance recreational access and opportunities at GUIS, Okaloosa Unit, through the construction of park amenities and enhancement of the entrance and parking areas.

Parameter	Purpose	Method	Timing, Frequency, Duration	Sample Size and Sites	Performance Criteria	Potential Corrective Action(s)
Visitor use/access	Monitor progress toward meeting the restoration objective.	Direct observations, including staff observations on-site using hand counters or recording forms, camera recordings, remote sensing, or aerial surveys.	Post construction, visual observations would be conducted 3 hours per quarter for 12 months.	4 times (once per quarter for the first year following completion of construction) at the Heron Bayou site.	Members of the public are able to use the constructed amenities.	N/A.

Parameter	Purpose	Method	Timing, Frequency, Duration	Sample Size and Sites	Performance Criteria	Potential Corrective Action(s)
Infrastructure constructed and/or enhanced and completed as designed	Monitor progress toward meeting the restoration objective.	Review of contractor reports, on-site inspections, and comparison of construction to "as-built" drawings or other planning materials.	Approximately monthly during construction and at the end of construction warranty period, unless otherwise provided by contract.	At locations of constructed amenities; approximately 12 times (monthly for 12 months of construction, or as necessary).	The shelters and other amenities are constructed and completed as designed and specified in the construction contract.	Resolution with contractor such that the terms of the contract are met.

4 Monitoring Schedule

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

Table 4-1 Monitoring Schedule

Monitoring Parameters	Pre-Execution Monitoring	Execution Monitoring (as-built)	Post-Execution Monitoring
Visitor use/access	N/A	X	X
Infrastructure constructed and/or enhanced and completed as designed	N/A	X	

5 Evaluation

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

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

6 Data Management

6.1 Data Description

Data collection will occur during construction and post construction and will be compiled within 12 months after collection. The data collection will occur within GUIS.

To the extent practicable, all visitor use data generated during monitoring activities will be documented using standardized field datasheets. If standardized datasheets are unavailable or not readily amendable to record Project-specific data, then Project-specific datasheets will be drafted prior to conducting any

Project monitoring activities. Original hardcopy datasheets and notebooks and photographs will be retained by the Implementing Trustee.

Relevant Project data that are handwritten on hardcopy datasheets or notebooks will be transcribed (entered) into standard digital format. All field datasheets and notebook entries will be scanned to PDF files. Electronic data files should be named with the date on which the file was created and should include a ReadMe file that describes when the file was created and by whom, and any explanatory notes on the file contents. If a data file is revised, a new copy should be made and the original preserved.

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

6.2 Data Review and Clearance

Relevant Project data that are handwritten on hardcopy datasheets or notebooks will be transcribed (entered) into standard digital format. After transcription of the data, the electronic data sheets will be verified 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 i) entered or converted into agreed upon/commonly used digital format; ii) labeled with metadata following FGDC/ISO standards to the extent practicable and in accordance with Implementing Trustee agency requirements.

After 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 (as described below). Before submitting the monitoring data and information package, co-Implementing Trustees shall confirm with one another that the package is approved for submission.

6.3 Data Storage and Accessibility

Once all data has been QA/QC'ed it will be submitted to the Restoration Portal. Trustees will provide DWH NRDA MAM data and information to the Restoration Portal as soon as possible and no more than one year from when data are collected.

6.4 Data Sharing

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

7 Reporting

Once all data have been reviewed for accuracy and completeness, they will be submitted to the Restoration Portal. Data will be made publicly available through the DIVER Explorer Interface.

8 Roles and Responsibilities

Data will be reviewed and submitted to the Restoration Portal by DOI project personnel.

Monitoring and Adaptive Management Plan for *Deepwater Horizon* NRDA Project:

REC6, Joe's Bayou Recreation Area Improvements

Prepared by: Nadia Martin (IEc) and FDEP; Draft Version Date: 8/5/2018

1 Introduction

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. Where applicable, it identifies key sources of uncertainty and incorporates monitoring data and decision points that address these uncertainties. As not all projects will have the same sources and degree of uncertainty, this project-specific MAM plan is scaled according to level of uncertainty, scope, scale, and restoration type associated with this project.

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

1.1 Project Overview

This project is being implemented as restoration for the DWH oil spill NRDA, consistent with the PDARP/PEIS.

- Programmatic Goal: Provide and Enhance Recreational Opportunities
- Restoration Type: Provide and Enhance Recreational Opportunities
- Restoration Approach: Enhance public access to natural resources for recreational use
- Restoration Technique: Construction or enhancement of recreational infrastructure
- TIG: FL TIG
- Restoration Plan: Restoration Plan #1

This restoration project would be implemented within Joe's Bayou Recreation Area, Destin, Okaloosa County, Florida. This project involves actions to improve access to the existing boat ramp; enhance recreational amenities; and enhance and restore the topography and natural resources at Joe's Bayou Recreation Area and Mattie Kelly Park and Nature Walk. This project is intended to enhance public access by providing improved access and parking in a heavily-used recreational area, by creating additional boardwalks and trails, and by providing new water access amenities for paddle and power-craft.

The implementing agency is FDEP. The partner agency is the City of Destin and the Choctawhatchee Basin Alliance.

1.2 Restoration Type Goals and Project Restoration Objectives

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

- Increase recreational opportunities such as fishing, beach-going, camping, and boating with a combination of ecological restoration and creation of infrastructure, access, and use opportunities (PDARP/PEIS Section 5.5.14.1).

The project restoration objectives are:

- Provide and enhance recreational access at Joe's Bayou Recreation Area by improving access to the existing boat ramp; enhancing recreational amenities; and enhancing and restoring the topography and natural resources.

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

2 Adaptive Management

Due to the nature of this project, and the use of standard Restoration Techniques that have been successfully implemented in similar projects, the FL TIG the FL TIG does not anticipate the need for rigorous adaptive management of the project. If project objectives are not being met, the FL TIG will identify corrective actions as necessary.

3 Project Monitoring, Performance Criteria, and Potential Corrective Actions

The proposed monitoring for this restoration project was developed to evaluate project performance, key uncertainties, and potential corrective actions, if needed. Information on each monitoring parameter is provided below, organized by objective (Table 3-1). Note that Table 3-1 does not include all possible options for corrective actions; 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.

Table 3-1 Monitoring Parameters

Objective 1: Provide and enhance recreational access at Joe's Bayou Recreation Area by improving access to the existing boat ramp; enhancing recreational amenities; and enhancing and restoring the topography and natural resources.

Parameter	Purpose	Method	Timing, Frequency, Duration	Sample Size and Sites	Performance Criteria	Potential Corrective Action(s)
Visitor use/access	Monitor progress toward meeting the restoration objective.	Direct observations, including staff observations on-site using hand counters or recording forms, camera recordings,	Post construction, visual observations would be conducted 3 hours per quarter for 12 months.	4 times (once per quarter for the first year following completion of construction) at	Members of the public are able to use the constructed amenities.	N/A.

Parameter	Purpose	Method	Timing, Frequency, Duration	Sample Size and Sites	Performance Criteria	Potential Corrective Action(s)
		remote sensing, or aerial surveys.		the Heron Bayou site.		
Infrastructure constructed and/or enhanced and completed as designed	Monitor progress toward meeting the restoration objective.	Review of contractor reports, on-site inspections, and comparison of construction to "as-built" drawings or other planning materials.	Approximately monthly during construction and at the end of construction warranty period, unless otherwise provided by contract.	At locations of constructed amenities; approximately 12 times (monthly for 12 months of construction, or as necessary).	The shelters and other amenities are constructed and completed as designed and specified in the construction contract.	Resolution with contractor such that the terms of the contract are met.

4 Monitoring Schedule

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

Table 4-1 Monitoring Schedule

Monitoring Parameters	Pre-Execution Monitoring	Execution Monitoring (as-built)	Post-Execution Monitoring
Visitor use/access	N/A	N/A	X
Infrastructure constructed and/or enhanced and completed as designed	N/A	X	

5 Evaluation

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

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

6 Data Management

6.1 Data Description

Data collection will occur during construction and post construction and will be compiled within 12 months after collection. The data collection will occur at the Park.

To the extent practicable, all visitor use data generated during monitoring activities will be documented using standardized field datasheets. If standardized datasheets are unavailable or not readily amendable to record Project-specific data, then Project-specific datasheets will be drafted prior to conducting any Project monitoring activities. Original hardcopy datasheets and notebooks and photographs will be retained by the Implementing Trustee.

Relevant Project data that are handwritten on hardcopy datasheets or notebooks will be transcribed (entered) into standard digital format. All field datasheets and notebook entries will be scanned to PDF files. Electronic data files should be named with the date on which the file was created and should include a ReadMe file that describes when the file was created and by whom, and any explanatory notes on the file contents. If a data file is revised, a new copy should be made and the original preserved.

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

6.2 Data Review and Clearance

Relevant Project data that are handwritten on hardcopy datasheets or notebooks will be transcribed (entered) into standard digital format. After transcription of the data, the electronic data sheets will be verified 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 i) entered or converted into agreed upon/commonly used digital format; ii) labeled with metadata following FGDC/ISO standards to the extent practicable and in accordance with Implementing Trustee agency requirements.

After 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 (as described below). Before submitting the monitoring data and information package, co-Implementing Trustees shall confirm with one another that the package is approved for submission.

6.3 Data Storage and Accessibility

Once all data has been QA/QC'ed it will be submitted to the Restoration Portal. Trustees will provide DWH NRDA MAM data and information to the Restoration Portal as soon as possible and no more than one year from when data are collected.

6.4 Data Sharing

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

7 Reporting

Once all data have been reviewed for accuracy and completeness, they will be submitted to the Restoration Portal. Data will be made publicly available through the DIVER Explorer Interface.

8 Roles and Responsibilities

Data will be reviewed and submitted to the Restoration Portal by FDEP project personnel.

Monitoring and Adaptive Management Plan for *Deepwater Horizon* NRDA Project:

REC7, Topsail Hill Preserve State Park Improvements

Prepared by: Nadia Martin (IEc) and FDEP; Draft Version Date: 8/5/2018

1 Introduction

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. Where applicable, it identifies key sources of uncertainty and incorporates monitoring data and decision points that address these uncertainties. As not all projects will have the same sources and degree of uncertainty, this project-specific MAM plan is scaled according to level of uncertainty, scope, scale, and restoration type associated with this project.

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

1.1 Project Overview

This project is being implemented as restoration for the DWH oil spill NRDA, consistent with the PDARP/PEIS.

- Programmatic Goal: Provide and Enhance Recreational Opportunities
- Restoration Type: Provide and Enhance Recreational Opportunities
- Restoration Approach: Enhance public access to natural resources for recreational use
- Restoration Technique: Construction or enhancement of recreational infrastructure
- TIG: FL TIG
- Restoration Plan: Restoration Plan #1

This restoration project would be implemented within the Topsail Hill Preserve State Park, Walton County, Florida. This project would enhance public access to the recreation area by providing a tram and bike-share stations; by improving access to the beach area and Campbell Lake; and by improving campground facilities. In addition, interpretive signage at the entrance and in other areas would increase awareness of the restoration efforts and of the rare coastal dune lake ecosystem.

The implementing agency is FDEP. The partner agency is the FDEP Division of Recreation and Parks.

1.2 Restoration Type Goals and Project Restoration Objectives

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

- Increase recreational opportunities such as fishing, beach-going, camping, and boating with a combination of ecological restoration and creation of infrastructure, access, and use opportunities (PDARP/PEIS Section 5.5.14.1).

The project restoration objectives are:

- Provide and enhance recreational access within Topsail Hill Preserve State Park by providing a tram and bike-share stations, improving access to the beach area and Campbell Lake and improving campground facilities.

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

2 Adaptive Management

Due to the nature of this project, and the use of standard Restoration Techniques that have been successfully implemented in similar projects, the FL TIG the FL TIG does not anticipate the need for rigorous adaptive management of the project. If project objectives are not being met, the FL TIG will identify corrective actions as necessary.

3 Project Monitoring, Performance Criteria, and Potential Corrective Actions

The proposed monitoring for this restoration project was developed to evaluate project performance, key uncertainties, and potential corrective actions, if needed. Information on each monitoring parameter is provided below, organized by objective (Table 3-1). Note that Table 3-1 does not include all possible options for corrective actions; 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.

Table 3-1 Monitoring Parameters

Objective 1: Provide and enhance recreational access at within Topsail Hill Preserve State Park by providing a tram and bike-share stations, improving access to the beach area and Campbell Lake and improving campground facilities.

Parameter	Purpose	Method	Timing, Frequency, Duration	Sample Size and Sites	Performance Criteria	Potential Corrective Action(s)
Visitor use/access	Monitor progress toward meeting the restoration objective.	Direct observations, including staff observations on-site using hand counters or recording forms, camera recordings, remote sensing, or aerial surveys.	Post construction, visual observations would be conducted 3 hours per quarter for 12 months.	4 times (once per quarter for the first year following completion of construction) at the Heron Bayou site.	Members of the public are able to use the constructed amenities.	N/A.
Infrastructure	Monitor	Review of contractor	Approximately	At locations of	The shelters	Resolution

Parameter	Purpose	Method	Timing, Frequency, Duration	Sample Size and Sites	Performance Criteria	Potential Corrective Action(s)
constructed and/or enhanced and completed as designed	progress toward meeting the restoration objective.	reports, on-site inspections, and comparison of construction to "as-built" drawings or other planning materials.	monthly during construction and at the end of construction warranty period, unless otherwise provided by contract.	constructed amenities; approximately 12 times (monthly for 12 months of construction, or as necessary).	and other amenities are constructed and completed as designed and specified in the construction contract.	with contractor such that the terms of the contract are met.

4 Monitoring Schedule

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

Table 4-1 Monitoring Schedule

Monitoring Parameters	Pre-Execution Monitoring	Execution Monitoring (as-built)	Post-Execution Monitoring
Visitor use/access	N/A	N/A	X
Infrastructure constructed and/or enhanced and completed as designed	N/A	X	

5 Evaluation

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

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

6 Data Management

6.1 Data Description

Data collection will occur during construction and post construction and will be compiled within 12 months after collection. The data collection will occur at the Park.

To the extent practicable, all visitor use data generated during monitoring activities will be documented using standardized field datasheets. If standardized datasheets are unavailable or not readily amendable to record Project-specific data, then Project-specific datasheets will be drafted prior to conducting any

Project monitoring activities. Original hardcopy datasheets and notebooks and photographs will be retained by the Implementing Trustee.

Relevant Project data that are handwritten on hardcopy datasheets or notebooks will be transcribed (entered) into standard digital format. All field datasheets and notebook entries will be scanned to PDF files. Electronic data files should be named with the date on which the file was created and should include a ReadMe file that describes when the file was created and by whom, and any explanatory notes on the file contents. If a data file is revised, a new copy should be made and the original preserved.

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

6.2 Data Review and Clearance

Relevant Project data that are handwritten on hardcopy datasheets or notebooks will be transcribed (entered) into standard digital format. After transcription of the data, the electronic data sheets will be verified 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 i) entered or converted into agreed upon/commonly used digital format; ii) labeled with metadata following FGDC/ISO standards to the extent practicable and in accordance with Implementing Trustee agency requirements.

After 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 (as described below). Before submitting the monitoring data and information package, co-Implementing Trustees shall confirm with one another that the package is approved for submission.

6.3 Data Storage and Accessibility

Once all data has been QA/QC'ed it will be submitted to the Restoration Portal. Trustees will provide DWH NRDA MAM data and information to the Restoration Portal as soon as possible and no more than one year from when data are collected.

6.4 Data Sharing

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

7 Reporting

Once all data have been reviewed for accuracy and completeness, they will be submitted to the Restoration Portal. Data will be made publicly available through the DIVER Explorer Interface.

8 Roles and Responsibilities

Data will be reviewed and submitted to the Restoration Portal by FDEP project personnel.

Monitoring and Adaptive Management Plan for *Deepwater Horizon* NRDA Project:

REC8, Camp Helen State Park Improvements

Prepared by: Nadia Martin (IEc) and FDEP; Draft Version Date: 8/5/2018

1 Introduction

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. Where applicable, it identifies key sources of uncertainty and incorporates monitoring data and decision points that address these uncertainties. As not all projects will have the same sources and degree of uncertainty, this project-specific MAM plan is scaled according to level of uncertainty, scope, scale, and restoration type associated with this project.

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

1.1 Project Overview

This project is being implemented as restoration for the DWH oil spill NRDA, consistent with the PDARP/PEIS.

- Programmatic Goal: Provide and Enhance Recreational Opportunities Restoration
- Restoration Type: Provide and Enhance Recreational Opportunities
- Restoration Approach: Enhance public access to natural resources for recreational use
- Restoration Technique: Construction or enhancement of recreational infrastructure
- TIG: FL TIG
- Restoration Plan: Restoration Plan #1

This restoration project would be implemented within the Camp Helen State Park, Bay County, Florida. This project would increase and enhance recreational opportunities at Camp Helen State Park. Specifically, the project would include the planning, design, permitting, and construction of various amenities in a new day-use area on the northern parcel of the park (north of US 98) and two docks and walkway extensions at the Lake Powell waterfront.

The implementing agency is FDEP in coordination with the Division of Recreation and Parks.

1.2 Restoration Type Goals and Project Restoration Objectives

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

- Increase recreational opportunities such as fishing, beach-going, camping, and boating with a combination of ecological restoration and creation of infrastructure, access, and use opportunities (PDARP/PEIS Section 5.5.14.1).

The project restoration objectives are:

- Provide and enhance recreational access within Camp Helen State Park by constructing amenities in a new day-use area and two docks and walkway extensions.

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

2 Adaptive Management

Due to the nature of this project, and the use of standard Restoration Techniques that have been successfully implemented in similar projects, the FL TIG the FL TIG does not anticipate the need for rigorous adaptive management of the project. If project objectives are not being met, the FL TIG will identify corrective actions as necessary.

3 Project Monitoring, Performance Criteria, and Potential Corrective Actions

The proposed monitoring for this restoration project was developed to evaluate project performance, key uncertainties, and potential corrective actions, if needed. Information on each monitoring parameter is provided below, organized by objective (Table 3-1). Note that Table 3-1 does not include all possible options for corrective actions; 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.

Table 3-1 Monitoring Parameters

Objective 1: Provide and enhance recreational access within Camp Helen State Park by constructing amenities in a new day-use area and two docks and walkway extensions.

Parameter	Purpose	Method	Timing, Frequency, Duration	Sample Size and Sites	Performance Criteria	Potential Corrective Action(s)
Visitor use/access	Monitor progress toward meeting the restoration objective.	Direct observations, including staff observations on-site using hand counters or recording forms, camera recordings, remote sensing, or aerial surveys.	Post construction, visual observations would be conducted 3 hours per quarter for 12 months.	4 times (once per quarter for the first year following completion of construction) at the Heron Bayou site.	Members of the public are able to use the constructed amenities.	N/A.
Infrastructure constructed and/or enhanced	Monitor progress toward meeting the	Review of contractor reports, on-site inspections, and comparison of	Approximately monthly during construction and at the end of	At locations of constructed amenities; approximately	The shelters and other amenities are constructed	Resolution with contractor such that the

Parameter	Purpose	Method	Timing, Frequency, Duration	Sample Size and Sites	Performance Criteria	Potential Corrective Action(s)
and completed as designed	restoration objective.	construction to "as-built" drawings or other planning materials.	construction warranty period, unless otherwise provided by contract.	12 times (monthly for 12 months of construction, or as necessary).	and completed as designed and specified in the construction contract.	terms of the contract are met.

4 Monitoring Schedule

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

Table 4-1 Monitoring Schedule

Monitoring Parameters	Pre-Execution Monitoring	Execution Monitoring (as-built)	Post-Execution Monitoring
Visitor use/access	N/A	N/A	X
Infrastructure constructed and/or enhanced and completed as designed	N/A	X	

5 Evaluation

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

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

6 Data Management

6.1 Data Description

Data collection will occur during construction and post construction and will be compiled within 12 months after collection. The data collection will occur at the Park.

To the extent practicable, all visitor use data generated during monitoring activities will be documented using standardized field datasheets. If standardized datasheets are unavailable or not readily amendable to record Project-specific data, then Project-specific datasheets will be drafted prior to conducting any Project monitoring activities. Original hardcopy datasheets and notebooks and photographs will be retained by the Implementing Trustee.

Relevant Project data that are handwritten on hardcopy datasheets or notebooks will be transcribed (entered) into standard digital format. All field datasheets and notebook entries will be scanned to PDF files. Electronic data files should be named with the date on which the file was created and should include a ReadMe file that describes when the file was created and by whom, and any explanatory notes on the file contents. If a data file is revised, a new copy should be made and the original preserved.

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

6.2 Data Review and Clearance

Relevant Project data that are handwritten on hardcopy datasheets or notebooks will be transcribed (entered) into standard digital format. After transcription of the data, the electronic data sheets will be verified 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 i) entered or converted into agreed upon/commonly used digital format; ii) labeled with metadata following FGDC/ISO standards to the extent practicable and in accordance with Implementing Trustee agency requirements.

After 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 (as described below). Before submitting the monitoring data and information package, co-Implementing Trustees shall confirm with one another that the package is approved for submission.

6.3 Data Storage and Accessibility

Once all data has been QA/QC'ed it will be submitted to the Restoration Portal. Trustees will provide DWH NRDA MAM data and information to the Restoration Portal as soon as possible and no more than one year from when data are collected.

6.4 Data Sharing

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

7 Reporting

Once all data have been reviewed for accuracy and completeness, they will be submitted to the Restoration Portal. Data will be made publicly available through the DIVER Explorer Interface.

8 Roles and Responsibilities

Data will be reviewed and submitted to the Restoration Portal by FDEP project personnel.

Monitoring and Adaptive Management Plan for *Deepwater Horizon* NRDA Project:

REC9, St. Andrews State Park Improvements

Prepared by: Nadia Martin (IEc) and FDEP; Draft Version Date: 8/5/2018

1 Introduction

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. Where applicable, it identifies key sources of uncertainty and incorporates monitoring data and decision points that address these uncertainties. As not all projects will have the same sources and degree of uncertainty, this project-specific MAM plan is scaled according to level of uncertainty, scope, scale, and restoration type associated with this project.

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

1.1 Project Overview

This project is being implemented as restoration for the DWH oil spill NRDA, consistent with the PDARP/PEIS.

- Programmatic Goal: Provide and Enhance Recreational Opportunities Restoration
- Restoration Type: Provide and Enhance Recreational Opportunities
- Restoration Approach: Enhance public access to natural resources for recreational use
- Restoration Technique: Construction or enhancement of recreational infrastructure
- TIG: FL TIG
- Restoration Plan: Restoration Plan #1

This restoration project would be implemented within the St. Andrews State Park, Bay County, Florida. This project would improve access to St. Andrews State Park's use areas and construction of additional recreational amenities at the park. Specifically, the project would include redesigning the entrance area to facilitate access and egress of vehicles at the ranger station for day-use visitors and campers and to help alleviate traffic congestion during peak visitation periods; improvements to the Lagoon Use area; improvements to existing parking areas; and the repaving of existing roadways in the Park.

The implementing agency is FDEP in coordination with the Division of Recreation and Parks.

1.2 Restoration Type Goals and Project Restoration Objectives

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

- Increase recreational opportunities such as fishing, beach-going, camping, and boating with a combination of ecological restoration and creation of infrastructure, access, and use opportunities (PDARP/PEIS Section 5.5.14.1).

The project restoration objectives are:

- Provide and enhance recreational access within St. Andrews State Park by redesigning the entrance area, improving the Lagoon Use area, and improving existing parking areas and roads.

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

2 Adaptive Management

Due to the nature of this project, and the use of standard Restoration Techniques that have been successfully implemented in similar projects, the FL TIG the FL TIG does not anticipate the need for rigorous adaptive management of the project. If project objectives are not being met, the FL TIG will identify corrective actions as necessary.

3 Project Monitoring, Performance Criteria, and Potential Corrective Actions

The proposed monitoring for this restoration project was developed to evaluate project performance, key uncertainties, and potential corrective actions, if needed. Information on each monitoring parameter is provided below, organized by objective (Table 3-1). Note that Table 3-1 does not include all possible options for corrective actions; 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.

Table 3-1 Monitoring Parameters

Objective 1: Provide and enhance recreational access within St. Andrews State Park by redesigning the entrance area, improving the Lagoon Use area, and improving existing parking areas and roads.

Parameter	Purpose	Method	Timing, Frequency, Duration	Sample Size and Sites	Performance Criteria	Potential Corrective Action(s)
Visitor use/access	Monitor progress toward meeting the restoration objective.	Direct observations, including staff observations on-site using hand counters or recording forms, camera recordings, remote sensing, or aerial surveys.	Post construction, visual observations would be conducted 3 hours per quarter for 12 months.	4 times (once per quarter for the first year following completion of construction) at the Heron Bayou site.	Members of the public are able to use the constructed amenities.	N/A.
Infrastructure constructed and/or enhanced	Monitor progress toward meeting the	Review of contractor reports, on-site inspections, and comparison of	Approximately monthly during construction and at the end of	At locations of constructed amenities; approximately	The shelters and other amenities are constructed	Resolution with contractor such that the

Parameter	Purpose	Method	Timing, Frequency, Duration	Sample Size and Sites	Performance Criteria	Potential Corrective Action(s)
and completed as designed	restoration objective.	construction to "as-built" drawings or other planning materials.	construction warranty period, unless otherwise provided by contract.	12 times (monthly for 12 months of construction, or as necessary).	and completed as designed and specified in the construction contract.	terms of the contract are met.

4 Monitoring Schedule

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

Table 4-1 Monitoring Schedule

Monitoring Parameters	Pre-Execution Monitoring	Execution Monitoring (as-built)	Post-Execution Monitoring
Visitor use/access	N/A	N/A	X
Infrastructure constructed and/or enhanced and completed as designed	N/A	X	

5 Evaluation

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

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

6 Data Management

6.1 Data Description

Data collection will occur during construction and post construction and will be compiled within 12 months after collection. The data collection will occur at the Park.

To the extent practicable, all visitor use data generated during monitoring activities will be documented using standardized field datasheets. If standardized datasheets are unavailable or not readily amendable to record Project-specific data, then Project-specific datasheets will be drafted prior to conducting any Project monitoring activities. Original hardcopy datasheets and notebooks and photographs will be retained by the Implementing Trustee.

Relevant Project data that are handwritten on hardcopy datasheets or notebooks will be transcribed (entered) into standard digital format. All field datasheets and notebook entries will be scanned to PDF files. Electronic data files should be named with the date on which the file was created and should include a ReadMe file that describes when the file was created and by whom, and any explanatory notes on the file contents. If a data file is revised, a new copy should be made and the original preserved.

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

6.2 Data Review and Clearance

Relevant Project data that are handwritten on hardcopy datasheets or notebooks will be transcribed (entered) into standard digital format. After transcription of the data, the electronic data sheets will be verified 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 i) entered or converted into agreed upon/commonly used digital format; ii) labeled with metadata following FGDC/ISO standards to the extent practicable and in accordance with Implementing Trustee agency requirements.

After 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 (as described below). Before submitting the monitoring data and information package, co-Implementing Trustees shall confirm with one another that the package is approved for submission.

6.3 Data Storage and Accessibility

Once all data has been QA/QC'ed it will be submitted to the Restoration Portal. Trustees will provide DWH NRDA MAM data and information to the Restoration Portal as soon as possible and no more than one year from when data are collected.

6.4 Data Sharing

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

7 Reporting

Once all data have been reviewed for accuracy and completeness, they will be submitted to the Restoration Portal. Data will be made publicly available through the DIVER Explorer Interface.

8 Roles and Responsibilities

Data will be reviewed and submitted to the Restoration Portal by FDEP project personnel.

Monitoring and Adaptive Management Plan for *Deepwater Horizon* NRDA Project:

REC10, T.H. Stone Memorial St. Joseph Peninsula State Park Improvements

Prepared by: Nadia Martin (IEc) and FDEP; Draft Version Date: 8/5/2018

1 Introduction

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. Where applicable, it identifies key sources of uncertainty and incorporates monitoring data and decision points that address these uncertainties. As not all projects will have the same sources and degree of uncertainty, this project-specific MAM plan is scaled according to level of uncertainty, scope, scale, and restoration type associated with this project.

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

1.1 Project Overview

This project is being implemented as restoration for the DWH oil spill NRDA, consistent with the PDARP/PEIS.

- Programmatic Goal: Provide and Enhance Recreational Opportunities
- Restoration Type: Provide and Enhance Recreational Opportunities
- Restoration Approach: Enhance public access to natural resources for recreational use
- Restoration Technique: Construction or enhancement of recreational infrastructure
- TIG: FL TIG
- Restoration Plan: Restoration Plan #1

This restoration project would be implemented within the T.H. Stone Memorial St. Joseph Peninsula State Park, in Gulf County, FL. Restoration activities involve the construction of a shared-use path at the Park to provide and enhance recreational opportunities. This project is intended to provide compensatory restoration for recreational losses in Florida resulting from the DWH oil spill.

The implementing agency is FDEP. The partner agencies include FDEP Division of Recreation and Parks.

1.2 Restoration Type Goals and Project Restoration Objectives

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

- Increase recreational opportunities such as fishing, beach-going, camping, and boating with a combination of ecological restoration and creation of infrastructure, access, and use opportunities (PDARP/PEIS Section 5.5.14.1).

The project restoration objectives are:

- Provide and enhance recreational access at T.H. Stone Memorial St. Joseph Peninsula State Park through a shared-use path.

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

2 Adaptive Management

Due to the nature of this project, and the use of standard Restoration Techniques that have been successfully implemented in similar projects, the FL TIG the FL TIG does not anticipate the need for rigorous adaptive management of the project. If project objectives are not being met, the FL TIG will identify corrective actions as necessary.

3 Project Monitoring, Performance Criteria, and Potential Corrective Actions

The proposed monitoring for this restoration project was developed to evaluate project performance, key uncertainties, and potential corrective actions, if needed. Information on each monitoring parameter is provided below, organized by objective (Table 3-1). Note that Table 3-1 does not include all possible options for corrective actions; 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.

Table 3-1 Monitoring Parameters

Objective 1: Provide and enhance recreational access at T.H. Stone Memorial St. Joseph Peninsula State Park through a shared-use path.

Parameter	Purpose	Method	Timing, Frequency, Duration	Sample Size and Sites	Performance Criteria	Potential Corrective Action(s)
Visitor use/access	Monitor progress toward meeting the restoration objective.	Direct observations, including staff observations on-site using hand counters or recording forms, camera recordings, remote sensing, or aerial surveys.	Post construction, visual observations would be conducted 3 hours per quarter for 12 months.	4 times (once per quarter for the first year following completion of construction) at the Heron Bayou site.	Members of the public are able to use the constructed amenities.	N/A.
Infrastructure constructed and/or enhanced	Monitor progress toward meeting the	Review of contractor reports, on-site inspections, and comparison of	Approximately monthly during construction and at the end of	At locations of constructed amenities; approximately	The shelters and other amenities are constructed	Resolution with contractor such that the

Parameter	Purpose	Method	Timing, Frequency, Duration	Sample Size and Sites	Performance Criteria	Potential Corrective Action(s)
and completed as designed	restoration objective.	construction to "as-built" drawings or other planning materials.	construction warranty period, unless otherwise provided by contract.	12 times (monthly for 12 months of construction, or as necessary).	and completed as designed and specified in the construction contract.	terms of the contract are met.

4 Monitoring Schedule

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

Table 4-1 Monitoring Schedule

Monitoring Parameters	Pre-Execution Monitoring	Execution Monitoring (as-built)	Post-Execution Monitoring
Visitor use/access	N/A	N/A	X
Infrastructure constructed and/or enhanced and completed as designed	N/A	X	

5 Evaluation

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

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

6 Data Management

6.1 Data Description

Data collection will occur during construction and post construction and will be compiled within 12 months after collection. The data collection will occur at the Park.

To the extent practicable, all visitor use data generated during monitoring activities will be documented using standardized field datasheets. If standardized datasheets are unavailable or not readily amendable to record Project-specific data, then Project-specific datasheets will be drafted prior to conducting any Project monitoring activities. Original hardcopy datasheets and notebooks and photographs will be retained by the Implementing Trustee.

Relevant Project data that are handwritten on hardcopy datasheets or notebooks will be transcribed (entered) into standard digital format. All field datasheets and notebook entries will be scanned to PDF files. Electronic data files should be named with the date on which the file was created and should include a ReadMe file that describes when the file was created and by whom, and any explanatory notes on the file contents. If a data file is revised, a new copy should be made and the original preserved.

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

6.2 Data Review and Clearance

Relevant Project data that are handwritten on hardcopy datasheets or notebooks will be transcribed (entered) into standard digital format. After transcription of the data, the electronic data sheets will be verified 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 i) entered or converted into agreed upon/commonly used digital format; ii) labeled with metadata following FGDC/ISO standards to the extent practicable and in accordance with Implementing Trustee agency requirements.

After 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 (as described below). Before submitting the monitoring data and information package, co-Implementing Trustees shall confirm with one another that the package is approved for submission.

6.3 Data Storage and Accessibility

Once all data has been QA/QC'ed it will be submitted to the Restoration Portal. Trustees will provide DWH NRDA MAM data and information to the Restoration Portal as soon as possible and no more than one year from when data are collected.

6.4 Data Sharing

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

7 Reporting

Once all data have been reviewed for accuracy and completeness, they will be submitted to the Restoration Portal. Data will be made publicly available through the DIVER Explorer Interface.

8 Roles and Responsibilities

Data will be reviewed and submitted to the Restoration Portal by FDEP project personnel.

Monitoring and Adaptive Management Plan for *Deepwater Horizon* NRDA Project:

REC11, St. Marks National Wildlife Refuge Coastal Trail Connection, Spring Creek to Port Leon

Prepared by: Nadia Martin (IEc) and USDA; Draft Version Date: 8/5/2018

1 Introduction

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. Where applicable, it identifies key sources of uncertainty and incorporates monitoring data and decision points that address these uncertainties. As not all projects will have the same sources and degree of uncertainty, this project-specific MAM plan is scaled according to level of uncertainty, scope, scale, and restoration type associated with this project.

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

1.1 Project Overview

This project is being implemented as restoration for the DWH oil spill NRDA, consistent with the PDARP/PEIS.

- Programmatic Goal: Provide and Enhance Recreational Opportunities Restoration
- Restoration Type: Provide and Enhance Recreational Opportunities
- Restoration Approach: Enhance public access to natural resources for recreational use
- Restoration Technique: Construction or enhancement of recreational infrastructure
- TIG: FL TIG
- Restoration Plan: Restoration Plan #1

This restoration project would be implemented within the St. Marks National Wildlife Refuge (NWR), Wakulla County, Florida. This project would provide and enhance recreational opportunities by improving access to and completing the Florida National Scenic Trail (FNST) at St. Marks NWR, a nationally recognized resource.

The implementing agency is the USDA, in coordination with the St. Marks NWR. Other project partners include the USFWS, Florida Trail Association (volunteer support organization), Framing Our Community (non-profit infrastructure support organization), and the NPS Southeast Archaeological Center.

1.2 Restoration Type Goals and Project Restoration Objectives

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

- Increase recreational opportunities such as fishing, beach-going, camping, and boating with a combination of ecological restoration and creation of infrastructure, access, and use opportunities (PDARP/PEIS Section 5.5.14.1).

The project restoration objectives are:

- Provide and enhance recreational access within St. Marks NWR through the completion of the Florida National Scenic Trail segment including two boardwalks and puncheon, 3-4 small-span bridges or boardwalks, suspension bridge, stringer bridge, and interpretive materials.

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

2 Adaptive Management

Due to the nature of this project, and the use of standard Restoration Techniques that have been successfully implemented in similar projects, the FL TIG the FL TIG does not anticipate the need for rigorous adaptive management of the project. If project objectives are not being met, the FL TIG will identify corrective actions as necessary.

3 Project Monitoring, Performance Criteria, and Potential Corrective Actions

The proposed monitoring for this restoration project was developed to evaluate project performance, key uncertainties, and potential corrective actions, if needed. Information on each monitoring parameter is provided below, organized by objective (Table 3-1). Note that Table 3-1 does not include all possible options for corrective actions; 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.

Table 3-1 Monitoring Parameters

Objective 1: Provide and enhance recreational access within St. Marks NWR through the completion of the Florida National Scenic Trail segment including two boardwalks and puncheon, 3-4 small-span bridges or boardwalks, suspension bridge, stringer bridge, and interpretive materials.

Parameter	Purpose	Method	Timing, Frequency, Duration	Sample Size and Sites	Performance Criteria	Potential Corrective Action(s)
Visitor use/access	Monitor progress toward meeting the restoration objective.	Direct observations, including staff observations on-site using hand counters or recording forms, camera recordings,	Post construction, visual observations would be conducted 3 hours per quarter for 12 months.	4 times (once per quarter for the first year following completion of construction) at	Members of the public are able to use the constructed amenities.	N/A.

Parameter	Purpose	Method	Timing, Frequency, Duration	Sample Size and Sites	Performance Criteria	Potential Corrective Action(s)
		remote sensing, or aerial surveys.		the Heron Bayou site.		
Infrastructure constructed and/or enhanced and completed as designed	Monitor progress toward meeting the restoration objective.	Review of contractor reports, on-site inspections, and comparison of construction to "as-built" drawings or other planning materials.	Approximately monthly during construction and at the end of construction warranty period, unless otherwise provided by contract.	At locations of constructed amenities; approximately 12 times (monthly for 12 months of construction, or as necessary).	The shelters and other amenities are constructed and completed as designed and specified in the construction contract.	Resolution with contractor such that the terms of the contract are met.

4 Monitoring Schedule

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

Table 4-1 Monitoring Schedule

Monitoring Parameters	Pre-Execution Monitoring	Execution Monitoring (as-built)	Post-Execution Monitoring
Visitor use/access	N/A	X	X
Infrastructure constructed and/or enhanced and completed as designed	N/A	X	

5 Evaluation

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

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

6 Data Management

6.1 Data Description

Data collection will occur during construction and post construction and will be compiled within 12 months after collection. The data collection will occur at the NWR.

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

Relevant Project data that are handwritten on hardcopy datasheets or notebooks will be transcribed (entered) into standard digital format. All field datasheets and notebook entries will be scanned to PDF files. Electronic data files should be named with the date on which the file was created and should include a ReadMe file that describes when the file was created and by whom, and any explanatory notes on the file contents. If a data file is revised, a new copy should be made and the original preserved.

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

6.2 Data Review and Clearance

Relevant Project data that are handwritten on hardcopy datasheets or notebooks will be transcribed (entered) into standard digital format. After transcription of the data, the electronic data sheets will be verified 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 i) entered or converted into agreed upon/commonly used digital format; ii) labeled with metadata following FGDC/ISO standards to the extent practicable and in accordance with Implementing Trustee agency requirements.

After 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 (as described below). Before submitting the monitoring data and information package, co-Implementing Trustees shall confirm with one another that the package is approved for submission.

6.3 Data Storage and Accessibility

Once all data has been QA/QC'ed it will be submitted to the Restoration Portal. Trustees will provide DWH NRDA MAM data and information to the Restoration Portal as soon as possible and no more than one year from when data are collected.

6.4 Data Sharing

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

7 Reporting

Once all data have been reviewed for accuracy and completeness, they will be submitted to the Restoration Portal. Data will be made publicly available through the DIVER Explorer Interface.

8 Roles and Responsibilities

Data will be reviewed and submitted to the Restoration Portal by USDA project personnel.

Appendix C. Impact Intensity Definitions

The intensity definitions utilized in the evaluation of potential environmental impacts from the reasonable range of alternatives covered in this RP/EA are provided below. These definitions are also provided in Table 6.3-2 in the PDARP/PEIS.

Resource	Impact Duration	Impact Intensity Definitions		
		Minor	Moderate	Major
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	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	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.

Resource	Impact Duration	Impact Intensity Definitions		
		Minor	**Moderate**	**Major**
		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.	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.	Wetlands: The action could cause a permanent loss of wetlands across a widespread area. The character of the wetlands could be changed so that the functions typically provided by the wetland could be permanently lost.
Air Quality	Short-term: During construction period. 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.
Noise	Short-term: During construction period. Long-term: Over the life of the project.	Increased noise could attract attention, but its contribution to the soundscape would be localized and unlikely to affect current user activities.	Increased noise could attract attention and contribute to the soundscape including in local areas and those adjacent to the action, but could not dominate. User activities could be affected.	Increased noise could attract attention and dominate the soundscape over widespread areas. Noise levels could eliminate or discourage user activities.
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	Impacts on native vegetation could be measurable but limited to local and adjacent areas. Occasional disturbance to individual plants could be expected. These disturbances could affect local populations negatively but could not be expected to affect regional population stability. Some impacts might occur in key habitats, but sufficient local habitat could retain function to maintain the viability of the species both locally and throughout its range.	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

Resource	Impact Duration	Impact Intensity Definitions		
		Minor	**Moderate**	**Major**
		species. Opportunity for increased spread of non-native species could be detectable but temporary and localized and could not displace native species populations and distributions.	Opportunity for increased spread of non-native species could be detectable and limited to local and adjacent areas, but could only result in temporary changes to native species population and distributions.	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 measurable 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.
Marine and Estuarine Fauna (Fish, Shellfish, Benthic Organisms)	Short-term: Lasting up to two spawning seasons, depending on length of season. Long-term: Lasting more than two spawning seasons.	Impacts could be detectable and localized but small. Disturbance of individual species could occur; however, there could be no change in the diversity or local populations of marine and estuarine species. Any disturbance could not interfere with key behaviors such as feeding and spawning. There could be no restriction of movements daily or seasonally.	Impacts could be readily apparent and result in a change in marine and estuarine species populations in local and adjacent areas. Areas being disturbed may display a change in species diversity; however, overall populations could not be altered. Some key behaviors could be affected but not to the extent that species viability is affected. Some movements could be	Impacts could be readily apparent and could substantially change marine and estuarine species populations over a wide-scale area, possibly river-basin-wide. Disturbances could result in a decrease in fish species diversity and populations. The viability of some species could be affected. Species movements could be seasonally

Resource	Impact Duration	Impact Intensity Definitions		
		Minor	**Moderate**	**Major**
		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.	restricted seasonally. 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.	constrained or eliminated. 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.
Socioeconomics and Environmental Justice	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.	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

Resource	Impact Duration	Impact Intensity Definitions		
		Minor	Moderate	Major
			However, the impact could be temporary and localized.	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.
Infrastructure	Short-term: During construction period. Long-term: Over the life of the project or longer.	The action could affect public services or utilities but the impact could be localized and within operational capacities. There could be negligible increases in local daily traffic volumes resulting in perceived inconvenience to drivers but no actual disruptions to traffic.	The action could affect public services or utilities in local and adjacent areas and the impact could require the acquisition of additional service providers or capacity. Detectable increase in daily traffic volumes (with slightly reduced speed of travel), resulting in slowed traffic and delays, but no change in level of service (LOS). Short service interruptions (temporary closure for a few hours) to roadway and railroad traffic could occur.	The action could affect public services or utilities over a widespread area resulting in the loss of certain services or necessary utilities. Extensive increase in daily traffic volumes (with reduced speed of travel) resulting in an adverse change in LOS to worsened conditions. Extensive service disruptions (temporary closure of one day or more) to roadways or railroad traffic could occur.
Land and Marine Management	Short-term: During construction period. Long-term: Over the life of the project or longer.	The action could require a variance or zoning change or an amendment to a land use, area comprehensive, or management plan, but could not affect overall use and management beyond the local area.	The action could require a variance or zoning change or an amendment to a land use, area comprehensive, or management plan, and could affect overall land use and management in local and adjacent areas.	The action could cause permanent changes to and conflict with land uses or management plans over a widespread area.
Tourism and Recreational Use	Short-term: During construction period. 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	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	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

Resource	Impact Duration	Impact Intensity Definitions		
		Minor	**Moderate**	**Major**
		could affect relatively few visitors or could not affect any related recreational activities.	be reopened after activities occur. Some users could choose to pursue activities in other available local or regional areas.	regional areas.
Fisheries and Aquaculture	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.	Many individuals, groups, businesses, properties, or institutions could be affected. Impacts could be readily apparent and detectable in local and adjacent areas and could have a noticeable effect on social and/or economic conditions.	A large number of individuals, groups, businesses, properties, or institutions could be affected. Impacts could be readily detectable and observed, extend over a widespread area, and could have a substantial influence on social and/or economic conditions.
Marine Transportation	Short-term: During construction period. Long-term: Over the life of the project or longer.	The action could affect public services or utilities, but the impact could be localized and within operational capacities. There could be negligible increases in local daily marine traffic volumes, resulting in perceived inconvenience to operators but no actual disruptions to transportation.	The action could affect public services or utilities in local and adjacent areas, and the impact could require the acquisition of additional service providers or capacity. Detectable increase in daily marine traffic volumes could occur (with slightly reduced speed of travel), resulting in slowed traffic and delays. Short service interruptions could occur (temporary delays for a few hours).	The action could affect public services utilities over a widespread area resulting in the loss of certain services or necessary utilities. Extensive increase in daily marine traffic volumes could occur (with reduced speed of travel), resulting in extensive service disruptions (temporary closure of one day or more).
Aesthetics and Visual Resources	Short-term: During construction period. Long-term: Over the life of the project or longer.	There could be a change in the view shed that was readily apparent but could not attract attention, dominate the view, or detract from current user activities or experiences.	There could be a change in the view shed that was readily apparent and attracts attention. Changes could not dominate the viewscape, although they could detract from the current user activities or experiences.	Changes to the characteristic views could dominate and detract from current user activities or experiences.
Public Health and Safety, Including Flood and Shoreline Protection	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.,	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	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

Resource	Impact Duration	Impact Intensity Definitions		
		Minor	**Moderate**	**Major**
		increased likelihood of storm surge) to visitors, residents, and workers from decreased shoreline integrity could be temporary and localized.	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.	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.

Appendix D. County Demographic Information

Environmental justice under NEPA is assessed as any disproportionately high adverse effects to low income, minority, and/or tribal populations. To evaluate the effects of the projects considered in this RP/EA, current demographic data from the U.S. Census Bureau and metrics such as air quality, hazardous waste proximity, and respiratory hazard index, from EPA were analyzed. The results of this analysis are detailed in this Appendix.

The projects and the demographic data for the counties in which they are located, as well as data for the State of Florida and the entire U.S. are listed in Table D-1. As demonstrated in Table D-1, the demographic data for each county is similar to the State of Florida and the United States as a whole. The percent of white individuals in the proposed project locations range from 42 to 92 percent relative to the State of Florida and the United States, both approximately 77 percent (U.S. Census Bureau 2018). While not environmental justice communities, those counties with a lower percent of white individuals (< 60 percent) are counties where the unpaved road improvements are proposed, which would have benefits to communities and would not result in any long-term adverse effects. Across all geographic areas, the percent of the population (aged 25 or older) with a high school education or higher is similar, ranging between 77 and 93 percent (Florida and U.S. both around 87 percent; U.S. Census Bureau 2018). With respect to poverty, the percent of persons in poverty ranges from 11 to 32 percent, where the State of Florida is approximately 13 percent and the United States is approximately 15 percent. While there are counties with higher proportions of the population in poverty, none of the projects are anticipated to disproportionately adversely impact those counties.

The EPA's Environmental Justice Screening and Mapping Tool (Version 2017) was used to assess impacts from the proposed projects regarding human health, the potential for multiple exposures or cumulative exposures, and historical exposures to environmental hazards. Based on the information in that platform, the project locations are below or similar to the State, Region, and U.S. percentiles for particulate matter (PM 2.5), ozone, National-Scale Air Toxics Assessment (NATA) diesel particulate matter, NATA cancer risk, NATA respiratory hazard index, traffic proximity, lead paint indicator, superfund proximity, RMP proximity, hazardous waste proximity, and waste discharge indicator.

Table D-1. County, State, and National Demographic Information

Location	Project(s) in Associated County	Population (2017)	Percent White Alone (2016)	Percent of population age 25 or older with high school education or higher (2012-2016)	Percent of population age 16 or older in civilian labor force (2012-2016)	Median household income, 2016 dollars (2012-2016)	Percent of persons in poverty
Bay County, FL	St. Andrews State Park Improvements Camp Helen State Park Improvements Grand Lagoon Regional Stormwater Facility St. Andrew Bay Unpaved Roads Initiative (P&D)	183,563	82.2%	88.7%	59.7%	$48,577	14.9%
Charlotte County, FL	Lower Charlotte Harbor Flatwood Hydrologic Restoration Planning Initiative, Yucca Pens Unit (P&D)	182,033	90.4%	89.4%	42.5%	$44,865	12.6%
Franklin County, FL	St. Vincent National Wildlife Refuge Predator Control Coastal Trail Connection: Spring Creek to Port Leon St. Marks National* City of Carrabelle's Lighthouse Estates: Septic Tank Abatement - Phase II MK Ranch Hydrologic Restoration	11,727	82.9%	79.6%	47.7%	$40,301	23.1%
Escambia County, FL	Gulf Islands National Seashore (Florida) Night Sky Restoration - Phase I Gulf Islands National Seashore (Florida) Beach and Dune Habitat Gulf Islands National Seashore (Florida) Invasive Plant Removal Gulf Islands National Seashore Beneficial Use of Dredged Materials at Perdido Key, Florida Gulf Islands National Seashore (Florida) Night Sky Restoration – Phase II Perdido River and Bay Paddle Trail Gulf Coast Marine Fisheries Center Amenities Perdido Bay Sunset Islands Snorkeling Trail Tarkiln Bayou Preserve State Park Improvements Pensacola Bay and Perdido River Watersheds - Nutrient Reduction Carpenter Creek Headwaters Water Quality Improvements Pensacola Beach Reclaimed Water System Expansion Pensacola Bay Unpaved Roads Initiative (P&D)	313,512	69.4%	89.9%	56.9%	$46,117	15.2%

Location	Project(s) in Associated County	Population (2017)	Percent White Alone (2016)	Percent of population age 25 or older with high school education or higher (2012-2016)	Percent of population age 16 or older in civilian labor force (2012-2016)	Median household income, 2016 dollars (2012-2016)	Percent of persons in poverty
Santa Rosa County, FL	Gulf Islands National Seashore (Florida) Night Sky Restoration – Phase Gulf Islands National Seashore (Florida) Beach and Dune Habitat Rattlesnake Bluff Road and Riverbank Restoration Pensacola Bay Unpaved Roads Initiative (P&D)	174,272	87.2%	90.2%	56.2%	$60,652	10.6%
Gulf County, FL	T.H. Stone Memorial St. Joseph Peninsula State Park Improvements City of Port St. Joe Stormwater Improvements MK Ranch Hydrologic Restoration	16,160	78.8%	82.5%	45.0%	$40,822	23.5%
Okaloosa County, FL	Gulf Islands National Seashore (Florida) Rehabilitation of Okaloosa Joe's Bayou Recreation Area Improvements Gulf Islands National Seashore (Florida) Night Sky Restoration - Phase II Rattlesnake Bluff Road and Riverbank Restoration Pensacola Bay Unpaved Roads Initiative (P&D)	202,970	81.6%	91.3%	58.2%	$57,655	10.7%
Wakulla County, FL	Coastal Trail Connection: Spring Creek to Port Leon St. Marks National*	32,120	82.4%	87.7%	56.5%	$54,078	13.1%
Jefferson County, FL	Coastal Trail Connection: Spring Creek to Port Leon St. Marks National*	14,144	62.6%	79.8%	43.9%	$41,696	18.9%
Walton County, FL	Topsail Hill Preserve State Park Improvements Coastal Dune Lake Hydrologic Restoration Project at Alligator Lake	68,376	89.7%	84.9%	56.7%	$46,910	13.1%
Levy County, FL	Lower Suwannee River Watershed - Nutrient Reduction Lower Suwannee National Wildlife Refuge Hydrologic Restoration - Phase I	40,355	87.4%	81.9%	49.0%	$35,480	21.4%
Dixie County, FL	Lower Suwannee National Wildlife Refuge Hydrologic Restoration - Phase I	16,300	87.6%	77.8%	39.3%	$34,634	25.4%
Jackson	Apalachicola Bay Watershed - Nutrient Reduction	52,138	91.6%	79.5%	53.7%	$38,422	17.5%

Location	Project(s) in Associated County	Population (2017)	Percent White Alone (2016)	Percent of population age 25 or older with high school education or higher (2012-2016)	Percent of population age 16 or older in civilian labor force (2012-2016)	Median household income, 2016 dollars (2012-2016)	Percent of persons in poverty
County, FL*							
Florida	N/A	20,984,400	77.6%	87.2%	58.5%	$48,900	14.7%
United States	N/A	325,719,178	76.9%	87.0%	63.1%	$55,322	12.7%
Source: United States Census Bureau. 2018. QuickFacts. Accessed 5/22/2018. https://www.census.gov/quickfacts/fact/table/US/PST045217							

Appendix E. Protected Species

The table below provides a list of state and federally listed species potentially occurring within each watershed area (where a restoration alternative considered in this RP/EA is located). Associated habitat information is also provided for each species.

Scientific Name	Common Name	State Status	Federal Status	Natural Communities/ Habitat Type	Coastal Barrier Island System	Perdido Bay	Pensacola River/ Bay	Choctawhatchee River/Bay	St. Andrew Bay	Apalachicola River/Bay	Ochlockonee River/Bay	St. Marks River & Apalachee Bay	Suwannee River/ Bay	Charlotte Harbor
Plants														
Actaea pachypoda	White baneberry	FE	E	Terrestrial: mixed pine-hardwood forest on mesic and occasionally xeric slopes of ravines and bluffs; occasional limestone outcrops						X				
Agrimonia incisa	Incised groove-bur	T	N	Terrestrial: Forest/Woodland, Woodland-Conifer, woodland - mixed		X	X			X	X		X	
Andropogon arctatus	Pinewoods bluesteam	T	N	Lacustrine: wet pine flatwoods, seepage wetlands, bogs, wet pine savanna		X	X	X	X	X	X	X	X	
Aquilegia canadensis var. australis	Mariana columbine	E	N	Terrestrial: woodland, rocky slopes							X			
Arabis canadensis	Sicklepod	E	N	Terrestrial: upland mixed forest, limestone outcrops					X	X				
Arica acaulis	Leopard's bane	E	N	Terrestrial: upland pine, bottomland forest						X				
Aristida simpliciflora	Southern threeawn	E	N	Palustrine: wet savannahs, upper portion of seepage bogs and wetland edge								X		
Arnoglossum diversifolia	Indian plantain	T	N	Palustrine: forested wetland				X	X	X	X	X	X	
Asclepia viridula	Southern milkweed	T	N	Estuarine: bay/sound; Terrestrial: savanna			X	X	X	X	X	X	X	

Scientific Name	Common Name	State Status	Federal Status	Natural Communities/ Habitat Type	Coastal Barrier Island System	Perdido Bay	Pensacola River/ Bay	Choctawhatchee River/Bay	St. Andrew Bay	Apalachicola River/Bay	Ochlockonee River/Bay	St. Marks River & Apalachee Bay	Suwannee River/ Bay	Charlotte Harbor
Asplenium monanthes	Single sorus spleenwort	E	N	Terrestrial: upland mixed forest									X	
Asplenium verecundum	Delicate spleenwort	E	N	Terrestrial: rockland hammocks, limestone outcrops, grottoes, and sinkholes				X	X				X	
Aster hemisphericus	Aster	E	N	Terrestrial: upland mixed forest, on sandstone outcrop				X	X	X				
Aster spinulosus	Pinewoods aster	E	N	Palustrine: seepage slope Terrestrial: sandhill, scrub and mesic flatwoods				X	X	X		X		
Balduina atropurpurea	Purple honeycomb-head	E	N	Palustrine: wet flatwoods, wet prairie									X	
Baptisia megacarpa	Apalachicola wild indigo	E	P	Palustrine: floodplain forest Terrestrial: upland mixed forest, slope forest				X	X	X	X	X		
Baptisia calycosa var. villosa	Hairy wild indigo	T	N	Palustrine: floodplain forest Terrestrial: upland mixed forest, slope forest		X	X							
Baptisia simplicifolia	Scareweed	T	SSC	Palustrine: floodplain forest Terrestrial: upland mixed forest, slope forest								X		
Blechnum occidentale var. minor	Hammock fern	E	N	Palustrine: hydric hammock, sinkhole									X	
Bigelowia nuttallii	Nuttall's rayless goldenrod	E	N	Riverine: seepage stream banks Terrestrial: scrub, upland pine forest - sandstone outcrops				X	X	X	X			
Brickellia cordifolia	Flyer's nemesis	E	N	Terrestrial: upland hardwood forest, near streams				X	X	X	X	X	X	
Calamintha dentata	Toothed savory	T	N	Terrestrial: longleaf pine-deciduous oak sandhills			X	X	X	X	X	X		

Scientific Name	Common Name	State Status	Federal Status	Natural Communities/ Habitat Type	Coastal Barrier Island System	Perdido Bay	Pensacola River/ Bay	Choctawhatchee River/Bay	St. Andrew Bay	Apalachicola River/Bay	Ochlockonee River/Bay	St. Marks River & Apalachee Bay	Suwannee River/ Bay	Charlotte Harbor
Calamovilfa curtissii	Curtiss' sandgrass	T	SSC	Palustrine: mesic and wet flatwoods, wet prairie, depression marsh; Terrestrial: mesic flatwoods		X	X	X	X			X		
Callirhoe papaver	Poppy mallow	E	N	Terrestrial: upland mixed forest, roadsides; edge or understory				X	X	X		X	X	
Calopogon multiflorus	Many-flowered grass pink	T	N	Palustrine: bog, forested wetland, herbaceous wetland; Terrestrial: forest edge, forest/woodland, grassland/herbaceous, savanna, woodland-conifer		X	X			X	X		X	X
Calycanthus floridus	Sweetshrub	E	CE	Terrestrial: upland hardwood forest, slope forest, bluffs; Palustrine: bottomland forest, stream banks, floodplains				X	X	X		X	X	
Calydorea coelestina	Bartram's ixia	E	N	Terrestrial: wet flatwoods, wet prairie									X	
Calystegia catesbaeiana	Catesby's bindweed	E	N	Terrestrial: Longleaf pine-wiregrass sandhill				X	X	X		X		
Carex baltzellii	Baltzell's sedge	T	CE	Terrestrial: forest/woodland, woodland-mixed		X	X	X	X	X				
Carex chapmanii	Chapman's sedge	T	N	Terrestrial Habitat(s): Forest - Mixed, Forest/Woodland							X		X	
Carex microdonta	Small-toothed sedge	E	N	Terrestrial: upland mixed forest, shell mound, rockland hammock; on limestone						X				
Centrosema arenicola	Sand butterfly pea	E	N	Terrestrial: dry to moist flatwoods with longleaf pine, wiregrass, and saw palmetto										X
Chamaesyce cumulicola	Sand dune spurge	E	N	Terrestrial: upland scrub, maritime hammock, beach dune, coastal stand									X	

Scientific Name	Common Name	State Status	Federal Status	Natural Communities/ Habitat Type	Coastal Barrier Island System	Perdido Bay	Pensacola River/ Bay	Choctawhatchee River/Bay	St. Andrew Bay	Apalachicola River/Bay	Ochlockonee River/Bay	St. Marks River & Apalachee Bay	Suwannee River/ Bay	Charlotte Harbor
Cheilanthes microphylla	Southern lip fern	E	N	Terrestrial: upland mixed forest, shell mound, rockland hammock; on limestone				X	X					
Chrysopsis cruseana	Cruise's goldenaster	E	SSC	Terrestrial: coastal dunes, coastal strand, coastal grassland; openings and blowouts				X	X					
Chrysopsis godfreyi	Godfry's goldenaster	E	N	Terrestrial: grassland/herbaceous, sand/dune, shrubland/chaparral		X		X	X					
Cladonia perforata	Perforate reindeer lichen	E	E	Terrestrial: sand/dune, shrubland/chapparal	X	X	X	X						
Cleistes divaricata	Spreading pogonia	T	N	Palustrine: wet flatwoods				X	X			X		
Coelorachis tuberculosa	Florida jointail	T	N	Lacustrine: shallow water Palustrine: herbaceous wetland, temporary pool				X	X				X	
Conrandina canescens	Short-leaved rosemary	N	E	Terrestrial: sandhill, scrub, oak scrub,upland habitats								X		
Conradina glabra	Apalachicola rosemary	FE	E	Terrestrial: sandhill dissected by ravines of the Sweetwater Creek system. Light shade to full sunlight; along edges of ravines, pine plantations, and roadsides						X	X	X		
Corallorhiza odontorhiza	Autumn coralroot	E	N	Terrestrial: upland hardwood forest									X	
Coreopsis integrifolia	Fringeleaf tickseed	E	P	Lacustrine: forested wetland, riparian				X	X	X				
Cornus alternifolia	Pagoda dogwood	E	CE	Palustrine: creek swamps Terrestrial: slope forest, upland hardwood forest, bluffs				X	X	X				
Ctenium floridanum	Florida toothache grass	E	N	Terrestrial: wet flatwoods, depression marsh, mesic flatwoods, scrubby flatwoods									X	

Scientific Name	Common Name	State Status	Federal Status	Natural Communities/ Habitat Type	Coastal Barrier Island System	Perdido Bay	Pensacola River/ Bay	Choctawhatchee River/Bay	St. Andrew Bay	Apalachicola River/Bay	Ochlockonee River/Bay	St. Marks River & Apalachee Bay	Suwannee River/ Bay	Charlotte Harbor
Crataegus phaenopyrum	Washington hawthorn	E	N	Palustrine: basin swamp, basin marsh, edges of wet areas				X	X			X		
Croomia paciflora	Croomia	E	N	Terrestrial: upland hardwood forest, slope forest, bluffs; Palustrine: bottomland forest, stream banks, floodplains						X	X			
Cryptotaenia canadensis	Honewort	E	N	Palustrine: floodplain forest, bottomland forest; Riverine: alluvial stream bank				X	X	X				
Cuphea aspera	Tropical waxweed	E	N	Palustrine: wet prairie, seepage slope Terrestrial: mesic flatwoods				X	X	X		X		
Deeringothamnus pulchellus	Beautiful pawpaw	FE	E	Terrestrial: xeric, mesic, and hydric pine flatwoods in western Charlotte and Lee counties.										X
Dirca palustris	Leatherwood	E	N	Terrestrial: shrub				X	X	X				
Drosera filiformis	Threadleaf sundew	E	N	Lacustrine: exposed lake bottoms				X	X	X				
Drosera intermedia	Water sundew	T	CE	Lacustrine: sinkhole lake edges Palustrine: seepage slope, wet flatwoods, depression marsh Riverine: seepage stream banks, drainage ditches				X	X	X		X		
Drosera tracyi	Tracy's sundew	E	N	Lacustrine: sinkhole lake edges Palustrine: seepage slope, wet flatwoods, depression marsh								X		
Echinacea purpurea	Eastern purple coneflower	E	N	Terrestrial: rockland hammocks, limestone outcrops, grottoes, and sinkholes						X				
Epigaea repens	Trailing arbutus	E	CE	Terrestrial: forest edge, roadside ditches			X			X				

Scientific Name	Common Name	State Status	Federal Status	Natural Communities/ Habitat Type	Coastal Barrier Island System	Perdido Bay	Pensacola River/ Bay	Choctawhatchee River/Bay	St. Andrew Bay	Apalachicola River/Bay	Ochlockonee River/Bay	St. Marks River & Apalachee Bay	Suwannee River/ Bay	Charlotte Harbor
Eriocaulon nigrobracteatum	Darkheaded hatpins	E	N	Palustrine: wet boggy seepage slopes, mucky soils				X	X	X				
Euphorbia commutate	Wood spurge	E	N	Terrestrial: rich calcareous forests, rock outcrops				X	X	X				
Euphorbia telephioides	Telephus spurge	FT	T	Terrestrial: mesic flatwoods; disturbed wiregrass areas, coastal scrub					X	X	X	X		
Fothergilla gardenia	Dwarf witchalder	E	N	Wet edges of baygalls, shrub swamps, pocosins, Carolina bays, atlantic white cedar forests, pitcher plant bogs, and wet savannas and flatwoods			X							
Forestiera godfreyi	Godfry's swamp privet	E	N	Terrestrial: forest-hardwood, on wooded slopes of lake & river bluffs				X	X	X	X	X	X	
Galactia smallii	Small's milkpea	N	E	Terrestrial: pine rockland habitat								X		
Gentiana pennelliana	Wiregrass gentian	E	SSC	Palustrine: seepage slope, wet prairie, roadside ditches Terrestrial: mesic flatwoods, planted slash pine				X	X	X	X	X		
Harperocallis flava	Harper's beauty	FE	E	Palustrine: seepage slope, wet prairie, roadside ditches					X	X		X		
Harrisia aboriginum	Aboriginal prickly-apple	FE	E	Terrestrial: coastal strand vegetation, tropical coastal hammocks, possibly on shell mounds										X
Hartwrightia floridana	Hartwrightia	T	N	Palustrine: seepage slope, wet flatwoods, baygall, bog, mesic flatwoods									X	
Hexastylis arifolia	Heartleaf wild ginger	T	CE	Riverine: seepage stream bank Terrestrial: slope forest			X	X	X	X		X		
Hybanthus concolor	Green violet	E	N	Terrestrial: upland mixed forest						X				

Scientific Name	Common Name	State Status	Federal Status	Natural Communities/ Habitat Type	Coastal Barrier Island System	Perdido Bay	Pensacola River/ Bay	Choctawhatchee River/Bay	St. Andrew Bay	Apalachicola River/Bay	Ochlockonee River/Bay	St. Marks River & Apalachee Bay	Suwannee River/ Bay	Charlotte Harbor
Hydrangea arborescens	Wild hydrangea	E	N	Terrestrial: rockland hammocks, limestone outcrops						X				
Hymenocallis godfreyi	Godfrey's spiderlily	E	N	Palustrine: herbaceous wetland							X	X		
Hymenocallis henryae	Panhandle spiderlily	E	N	Palustrine: bog/fen, herbaceous wetland; Terrestrial: forest woodland			X	X	X	X	X			
Hypericum lissophloeus	Smoothbark St. John's wort	E	N	Lacustrine: sandhill upland lake margins Terrestrial: sandhill margins				X	X					
Ilex amelanchier	Serviceberry holly	T	N	Palustrine: forested wetlands, mixed hardwood wetland			X	X	X	X				
Isotria verticillata	Whorled pogonia	E	N	Terrestrial: sloped forest				X	X	X				
Juncus gymnocarpus	Coville's rush	E	N	Palustrine: wet prairie, wet flatwoods, herbaceous wetland				X	X					
Justicia crassifolia	Thickleaved waterwillow	E	N	Palustrine: dome swamp, seepage slope Terrestrial: mesic flatwoods				X	X	X	X	X		
Kalmia latifolia	Mountain laurel	T	CE	Riverine: seepage stream bank Terrestrial: slope forest, seepage stream banks				X	X	X		X		
Lachnocaulon digynum	Panhandle bog buttons	T	N	Riverine: pool Palustrine: bog/fen, forested wetland		X		X	X	X	X	X		
Lechea divaricate	Pine pinweed	E	N	Terrestrial: scrub, scrubby flatwoods									X	X
Leitneria floridana	Corkwood	T	N	Riverine: seepage stream bank Terrestrial: slope forest, seepage stream banks	X					X	X	X	X	
Liatris gholsonii	Gholson's blazing star	E	N	Terrestrial: mesic flatwoods						X				
Liatris provincialis	Godfrey's gayfeather	E	N	Terrestrial: sandhill, scrub, coastal grassland; disturbed areas				X	X		X	X		

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Lilium catesbaei	Catesby lily	T	CE	Palustrine: wet prairie, wet flatwoods, seepage slope Terrestrial: mesic flatwoods, seepage slope; usually with grasses				X	X			X		
Lilium iridollae	Panhandle lily	E	P	Palustrine Habitat(s): Bog/fen, herbaceous wetland, Riparian, scrub-shrub wetland		X	X							
Lilium michauxii	Carolina lily	E	N	Palustrine Habitat(s): Bog/fen, herbaceous wetland, Riparian, scrub-shrub wetland				X	X	X				
Linum carteria var. smallii	Small's flax	E	N	Terrestrial; pine rocklands, pine flatwoods, and disturbed areas										X
Linum westii	West's flax	E	P	Palustrine: Bog/fen, forested wetland, herbaceous wetland Terrestrial: Forest/Woodland, Woodland - Mixed	X	X	X	X	X	X	X	X	X	
Litsea aestvalis	Pondspice	E	SSC	Palustrine: Bog/fen		X	X				X		X	
Lobelia boykinii	Boykin's lobelia	E	P	Palustrine: Forested wetland, herbaceous wetland, scrub-shrub wetland Terrestrial: Forest/Woodland, Savanna, Woodland - Conifer		X	X			X	X			
Lupinus westianus	Gulf coast lupine	T	SSC	Terrestrial: beach dune, scrub, disturbed areas, roadsides, blowouts in dunes	X	X	X	X	X	X	X	X		
Lynthrum curtissii	Curtiss' loosestrife	E	P	Palustrine: wet flatwoods edges, floodplain swamp, seepage slope, dome swamp edges Terrestrial: seepage slope						X	X			

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Macbridea alba	White birds-in-a-nest	FT	T	Palustrine: seepage slope Terrestrial: grassy mesic pine flatwoods, savannahs, roadsides, and similar habitat					X	X	X	X		
Macranthera flammea	Hummingbird flower	E	CE	Palustrine: seepage slope, dome swamp edges, flooplain swamps; Riverine: seepage stream bank; Terrestrial: seepage slopes		X	X	X	X	X	X	X		
Magnolia ashei	Ashe's magnolia	E	SSC	Terrestrial: slope and upland hardwood forest, ravines		X	X	X	X	X	X	X	X	
Magnolia pyramidata	Pyramid magnolia	E	CE	Terrestrial: slope forest				X	X	X		X		
Malaxis unifloria	Green addersmouth	E	CE	Palustrine: floodplain forest Terrestrial: slope forest, upland mixed forest		X		X	X	X		X	X	
Malus angustifolia	Southern crabapple	T	N	Terrestrial: mesic forest, woodland border, fence row, old fields				X	X			X		
Marshallia obovate	Barbara's buttons	E	N	Terrestrial: sandhill, upland mixed forest				X	X	X				
Marshallia ramose	Barbara's buttons	E	N	Terrestrial: upland pine forest, with wiregrass				X	X					
Matelea alabamensis	Alabama spinypod	E	N	Terrestrial: cliff forest – hardwood, forest – mixed, forest edge, forest woodland		X	X	X	X	X	X			
Matelea baldwiniana	Baldwin's spinypod	E	N	Terrestrial: bluff, upland mixed forest, bottomland forest, roadsides; calcareous soil				X	X	X				
Matelea flavidula	Yellow-flowered spinypod	E	N	Terrestrial: moist, nutrient-rich forests , wooded slopes				X	X	X				

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Matalea floridana	Florida spinypod	E	N	Terrestrial Habitat(s): Forest - Hardwood, Forest - Mixed, Forest/Woodland, Woodland - Hardwood, Woodland - Mixed							X		X	
Myriopteris microphylla	Southern lip fern	E	N	Terrestrial: upland mixed forest, rockland hammock, shell mound									X	
Najas filifolia	Narrowleaf naiad	T	N	Lacustrine: blackwater stream, clastic upland lake, flatwoods/prairie lake, sandhill upland lake									X	
Nemastylis floridana	Celestial lily	E	N	Palustrine: seepage slope, dome swamp, depression marsh									X	X
Nolina atopocarpa	Florida beargrass	T	N	Terrestrial: forest/woodland, woodland - Conifer	X						X		X	X
Orbexilum virgatum	Pineland scurfpea	E	N	Terrestrial: dry to moist longleaf pine-wiregrass savanna and flatwoods									X	
Opuntia stricta	Prickly pear cactus	T	N	Terrestrial: uplands, scrub								X		
Oxypolis greenmanii	Giant water-dropwort	E	N	Palustrine: dome swamp, wet flatwoods, ditches: in water			X	X	X	X	X			
Pachysandra procumbens	Allegheny spurge	E	N	Terrestrial: upland mixed forest, bluff; calcareous soil				X	X	X				
Panicum nudicaule	Naked stemmed panicgrass	T	N	Terrestrial: pine flatwoods, savanna, dry to mesic			X	X	X	X	X			
Parnassia grandifolia	Large leaved grass of parnassus	E	N	Palustrine: seepage slope bogs, and fens							X			
Paronychia chartacea	Papery whitlow-wort	E	T	Terrestrial: karst sandhill lake margins				X	X	X				
Pecluma plumula	Plume polypody	E	N	Palustrine: hydric hammock, floodplain forest, bottomland forest, basin swamp									X	

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Pellaea atropurpurea	Hairy cliffbrake fern	E	N	Terrestrial: upland glade				X	X					
Phoebanthus tenuifolius	Narrowleaf phoebanthus	T	N	Terrestrial: sandy pinlands				X	X	X	X	X	X	
Phyllanthus liebmannianus var. platylepis	Pinewoods dainties	E	N	Terrestrial: roadside ditches, forest, disturbed areas, savannas							X		X	
Physocarpus opulifolius	Ninebark	E	N	Riverine: seepage stream banks				X	X	X				
Physostegia godfreyi	Apalachicola dragon-head	T	N	Palustrine: wet prairie, creek swamps, titi swamps, bogs						X	X		X	
Pinckneya bracteata	Fever tree	T	N	Palustrine: creek swamps, titi swamps, bogs				X	X			X		
Pinguicula ionantha	Godfrey's butterwort	FT	T	Palustrine: wet flatwoods, wet prairie, bog; in shallow water; Riverine: seepage slope; in shallow water. Also, roadside ditches and similar habitat				X	X	X	X	X		
Pinguicula lutea	Yellow butterwort	T	CE	Palustrine: flatwoods, bogs				X	X			X		
Pinguicula planifolia	Swamp butterwort	T	SSC	Palustrine: wet flatwoods, seepage slopes, bog, dome swamp, ditches, in water				X	X			X		
Pinguicula primuliflora	Primrose-flowered butterwort	E	CE	Palustrine: bogs, pond margins, margins of spring runs		X	X		X	X	X	X	X	
Pityopsis flexuosa	Zigzag silkgrass	E	SSC	Terrestrial Habitat(s): Sand/dune, Shrubland/chaparral							X			
Platanthera blephariglottis	Whitefringed orchid	T	N	Palustrine: bogs, wet flatwoods; Terrestrial: bluff				X	X			X		
Platanthera ciliaris	Yellowfringed orchid	T	CE	Palustrine: bogs, wet flatwoods Terrestrial: bluff				X	X			X		

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Platanthera clavellata	Green rein orchid	E	N	Lacustrine: seepages, springs (usually wooded); shrub borders of acid bogs; swamp woods; creek floodplains; occasionally open fens; and in the northern or mountainous part of its range, seepage slopes or sunlit stream beds, disturbed sites, such as abandoned quarries, roadbanks, ditches, and sandy-acid mine tailings				X	X	X		X		
Platanthera integra	Yellow fringeless orchid	E	CE	Palustrine: bogs, wet flatwoods; Terrestrial: bluff		X	X	X	X	X	X	X	X	X
Platanthera nivea	Orange rein orchid	E	CE	Palustrine: wet prairie, seepage slope Terrestrial: mesic flatwoods				X	X			X		
Podophyllum peltatum	Mayapple	E	N	Terrestrial: mesic hardwood forests, dry-mesic oak-hickory forests				X	X	X				
Polygonella macrophylla	Large-leaved jointweed	T	SSC	Terrestrial: scrub, sand pine/oak scrub ridges		X	X	X	X	X	X	X	X	
Polymnia laevigata	Tennessee leaf-cup	E	N	Terrestrial: rich wooded slopes in light to dense shade of mixed mesophytic woods				X	X	X				
Potamogeton floridanus	Florida pondweed	E	P	Riverine: low gradient, spring/spring brook			X							
Pteroglossaspis ecristata	Giant orchid	T	SSC	Terrestrial: forest edge, forest/woodland, old field, savanna, shrubland/chaparral, woodland-conifer		X	X						X	
Pycnanthemum floridanum	Florida mountain mint	T	N	Wet swales/depressions in pine flatwoods; wet prairies, floodplain forest, soils are typically black sandy peats							X		X	

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Quercus arkansana	Arkansas oak	T	N	Sandy or sand clay uplands or upper ravine slopes near heads of streams in deciduous woods		X	X	X	X	X	X			
Rhexia parviflora	Apalachicola meadowbeauty	E	P	Palustrine: dome swamp margin, seepage slope, depression marsh; on slopes; with hypericum		X		X	X	X	X	X	X	
Rhexia salicifolia	Panhandle meadowbeauty	T	P	Lacustrine: full sun in wet sandy or sandy-peaty areas of sinkhole pond shores, interdunal swales, margins of depression, marshes, flatwoods, ponds and sandhill upland lakes		X	X	X	X	X	X	X	X	
Rhododendron austrinum	Florida flame azalea	E	CE	Lacustrine: shaded ravines & in wet bottomlands on rises of sandy alluvium or older terraces		X	X	X	X	X	X	X	X	
Rhododendron chapmanii	Chapman's rhododendron	FE	E	Palustrine: seepage slope (titi bog) Terrestrial: mesic flatwoods; ecotone between flatwoods or more xeric longleaf communities and titi bogs				X	X	X	X		X	
Rhyncospora crinipes	Hairy peduncled beaksedge	E	P	Palustrine Habitat(s): Riparian			X		X	X				
Ribes echinellum	Miccosukee gooseberry	FT	T	Lacustrine: shores of Lake Miccosukee								X		
Rudbeckia nitida	St. John's susan	E	N	Palustrine: wet flatwoods and prairies, roadside ditches				X	X		X		X	
Ruellia noctiflora	Nightflowering wild petunia	E	N	Lacustrine: moist to wet coastal pinelands, bogs, low meadows, open pine savannahs			X	X	X	X	X	X	X	
Salix eriocephala	Heartleaved willow	E	N	Palustrine: floodplain swamp, alluvial woodlands				X	X	X		X		
Salix floridana	Florida willow	E	N	Palustrine: spring run stream, hydric hammock, bottomland forest									X	

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Salvia urticifolia	Nettle-leaved sage	E	N	Terrestrial: upland glade				X	X	X			X	
Sarracenia leucophylla	White-top Pitcherplant	E	SSC	Palustrine: wet prairie, seepage slope, baygall edges, ditches		X	X	X	X	X	X	X		
Sarracenia minor	Hooded pitcher plant	T	CE	Palustrine: seepage slopes and bogs; wet flatwoods								X		
Sarracenia psitticina	Parrot pitcher plant	T	CE	Palustrine: wet flatwoods, wet prairie, seepage slope				X	X	X		X		
Sarracenia purpurea	Decumbant pitcher plant	T	CE	Palustrine: wet flatwoods, wet prairie, seepage slope				X	X	X		X		
Sarracenia rubra	Sweet pitcherplant	E	CE	Palustrine: bog, wet prairie, seepage slope, wet flatwoods Riverine: seepage stream banks		X	X		X	X				
Schisandra glabra	Bay starvine	E	N	Rich mesic woods twining over subcanopy and understory trees, usually in bottomlands or in the bluffs along creeks and rivers generally on rich sandy-silt-loams; The forests it frequents are almost always mixed-mesophytic							X			
Schizachyrium niveum	Scrub bluesteam	E	N	Terrestrial: white sand patches in rosemary scrub, sand pine scrub, oak scrub										X
Schwalbea americana	American chaffseed	FE	E	Palustrine: wet prairie Terrestrial: scrub, sandhill, mesic flatwoods						X	X			
Scutellaria floridana	Florida skullcap	E	T	Palustrine: seepage slope, wet flatwoods, grassy openings Terrestrial: mesic flatwoods				X	X	X	X	X	X	

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Sideroxylon alachuense	Silver buckthorn	E	N	Terrestrial: upland hardwood forests around limesinks and on shell mounds									X	
Sideroxylon lycioides	Buckthorn	E	N	Palustrine: bottomland forest, dome swamp, floodplain forest; Terrestrial: upland hardwood forest				X	X	X		X	X	
Sideroxylon thornei	Thorn's buckthorn	E	N	Palustrine: hydric hammock, floodplain swamp				X	X	X		X		
Silene polypetala	Fringed campion	FE	E	Terrestrial: upland mixed forest, slope forest, and along utility corridors in appropriate habitats						X				
Silene virginica	Fire pink	E	N	Terrestrial: hardwood forest in Bay County				X	X	X				
Spigelia gentianoides	Gentian pinkroot	FE	E	Terrestrial: mixed hardwood forest, rich humus				X	X	X	X			
Spigelia loganioides	Pinkroot	E	N	Palustrine: hydric hammock, bottomland forest									X	
Spiranthes laciniata	Lace-lip ladies tresses	T	N	Palustrine: wet flatwoods				X	X			X		
Stachydeoma graveolens	Mock pennyroyal	E	N	Palustrine: forested wetland Terrestrial: forest edge, forest/woodland, savanna, woodland - conifer				X	X	X	X	X	X	
Stachys hyssopifolia var. lythroides	Tallahassee hedge nettle	E	N	Palustrine: wet borders of ponds and sinkholes, depressions and moist slopes in longleaf pine forests, and clearings in bottomland forests							X			
Stewartia malacodendron	Silky camellia	E	CE	Palustrine: baygall Terrestrial: slope forest, upland mixed forest; acid soils		X	X	X	X	X		X		
Taxus floridana	Florida yew	E	N	Terrestrial: upland mixed forest, slope forest						X				

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Tephrosia mohrii	Pineland hoary-pea	T	N	Longleaf pine turkey oak sandhills		X	X							
Thalictrum cooleyi	Cooley's meadowrue	E	E	Palustrine: seepage slope, edges of shrub bogs, disturbed areas; one site on Champion International Corp. land						X				
Thalictrum thalictroides	Rue-anemone	E	CE	Terrestrial: slope forest, limestone outcrops						X				
Thelypteris reptans	Creeping maiden fern	E	N	Terrestrial: rockland hammock, sinkhole									X	
Torreya taxifolia	Florida torreya	FE	E	Terrestrial: slope forest, upland mixed forest, and ravines						X				
Trillium lancifolium	Narrowleaf trillium	E	N	Palustrine: bottomland forest Terrestrial: upland mixed forest, slope forest				X	X	X	X			
Uvularia floridana	Florida Merrybells	E	N	Palustrine Habitat(s): Forested Wetland, Riparian; Terrestrial Habitat(s): Forest - Hardwood, Forest/Woodland						X	X			
Verbesina chapmanii	Chapman's crownbeard	T	CE	Palustrine: seepage slope Terrestrial: mesic flatwoods with wiregrass				X	X			X		
Verbesina heterophylla	Variable leaf crownbeard	E	N	Terrestrial: mesic flatwoods, sandhill									X	
Xanthorhiza simplicissima	Yellowroot	E	CE	Riverine: seepage stream; sandy banks				X	X	X				
Xyris isoetifolia	Quillwort yelloweyed grass	E	N	Lacustrine: sandhill upland lake margins Palustrine: wet flatwoods, wet prairie				X	X	X				
Xyris longisepala	Kral's yelloweyed grass	E	P	Lacustrine: sandhill upland lake margins				X	X		X	X	X	
Xyris scabrifolia	Harper's yellow-eyed	T	SSC	Palustrine: seepage slope, wet		X	X	X	X	X	X	X	X	

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	grass			prairie, bogs										
Xyris stricta var. obscura	Kral's yelloweyed grass	E	N	Lacustrine: sandhill upland lake margins		X				X				
Invertebrates														
Amblema neislerii	Fat threeridge	E	E(CH)	Riverine: main channels of small to large rivers in slow to moderate currents; fine to medium silty sand, also mixtures of sand, clay, and gravel. Panhandle drainages: Chipola and Apalachicola Rivers						X				
Elliptio chipolaensis	Chipola slabshell	T	T(CH)	Riverine: main channel of the Chipola River and its larger tributaries in substrate combinations of silt, clay, sand and occasionally gravel. Panhandle drainages: Chipola River						X				
Elliptoideus sloatianus	Purple bankclimber	T	T(CH)	Riverine: small to large rivers in sand, sand mixed with mud, or gravel substrates with slow to moderate currents. Panhandle drainages: Chipola, Apalachicola, and Ochlockonee Rivers						X	X			
Fusconaia burkei	Tapered pigtoe	T	T(CH)	Riverine				X	X					
Fusconiaia escambia	Narrow pigtoe	T	T(CH)	Riverine: big river, creek, low gradient, medium river, pool, riffle			X							
Hamiota australis	Southern sandshell	T	T(CH)	Riverine			X	X	X					
Lampsilis subangulata	Shiny-rayed pocketbook	E	E(CH)	Riverine: mid-sized rivers and creeks with a clear or sandy silt floor							X			
Medionidus penincilliatus	Gulf moccasinshell	FE	E(CH)	Riverine: medium-sized creeks to large rivers with sand and gravel substrates					X	X	X			

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				in slow to moderated currents										
Medionidus simpsonianus	Ochlockonee moccasinshell	E	E(CH)	Riverine: large creeks and mid-sized rivers of moderate current and sandy, gravel floor							X			
Meionidus walker	Suwannee moccasinshell	T	T	Riverine: creeks and mid-sized rivers									X	
Pleurobema pyriforme	Oval pigtoe	E	E(CH)	Riverine: medium-sized creeks to small rivers; various substrates; slow to moderate currents					X	X	X		X	
Pleurobema strodeanum	Fuzzy pigtoe	T	T(CH)	Riverine			X	X	X					
Procambarus apalachicolae	Coastal flatwoods crayfish	SSC	P	Lacustrine: shallow water Palustrine: herbaceous wetlands, temporary lentic situations, depressions in flatwoods					X					
Procambarus econfinae	Panama City crayfish	SSC	P	Palustrine: wet flatwoods; temporary or fluctuating ponds or semi permanently inundated ditches, also ruderal, roadside ditches and utility easements					X					
Procambarus erythrops	Sante Fe cave crayfish	T	N	Aquatic: Aquatic cave									X	
Ptychobranchus jonesi	Southern kidneyshell	E	E(CH)	Riverine			X	X						
Villovsa choctawensis	Choctaw bean	E	E(CH)	Riverine			X	X	X					
Fish														
Acipenser oxyrinchus desotoi	Gulf sturgeon	*	T(CH)	Estuarine: various Marine: various habitats Riverine: alluvial and blackwater streams	X	X	X	X	X	X	X	X	X	X

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Alosa alabamae	Alabama shad	NL	SSC	Main channel of the Apalachicola River	X					X				
Crystallaria asprella	Crystal darter	T	N	Riverine: creek, medium river, moderate grade			X							
Etheostoma histrio	Harlequin darter	SSC	N	Riverine: creek, medium river, moderate grade			X							
Etheostoma okaloosae	Okaloosa darter	T	T	Riverine Habitat(s): creek, medium river, Moderate gradient			X	X						
Fundulus jenkinsi	Saltmarsh topminnow	T	SSC	Estuarine Habitat(s): Herbaceous wetland, Lagoon, Tidal flat/shore Palustrine Habitat(s): Herbaceous wetland	X	X	X							
Notropis melanostomus	Blackmouth shiner	T	N	Riverine: creek, low gradient, medium river, pool; Lacustrine: shallow water; Palustrine: forested wetland			X							
Pteronotropis welaka	Bluenose shiner	T	N	Riverine: creek, low gradient, medium river, pool		X	X	X	X	X				
Amphibians														
Ambystoma bishopi	Reticulated flatwoods salamander	E	E	Palustrine: wet flatwoods, dome swamp, basin swamp, Terrestrial: mesic flatwoods (reproduces in ephemeral wetlands within this community)		X	X	X	X	X				
Ambystoma cingulatum	Frosted flatwoods salamander	T	T(CH)	Palustrine: wet flatwoods, dome swamp, basin swamp, Terrestrial: mesic flatwoods (reproduces in ephemeral wetlands within this community)						X	X	X	X	
Haideotriton wallacei	Georgian blind	T	P	Subterranean: aquatic cave				X		X				

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	salamander													
Lithobates capito	Gopher frog	SSC	P	Terrestrial; sandhill, scrub, scrubby flatwoods, xeric hammock (reproduces in ephemeral wetlands within these communities)				X	X	X	X	X		
Notophthalmus perstriatus	Striped newt	C	C	Lacustrine: Shallow water Palustrine: Forested Wetland, Herbaceous Wetland, Riparian, Temporary Pool Terrestrial: Woodland - Conifer, Woodland - Mixed						X	X	X		
Reptiles														
Alligator mississippiensis	American alligator	T	SAT	Estuarine: herbaceous wetland Riverine: river, creek, low gradient, medium river, pool, spring/spring brook Lacustrine: shallow water	X	X	X	X	X	X	X	X	X	X
Caretta caretta	Loggerhead sea turtle	T	T(CH)	Terrestrial: sandy beaches; nesting	X	X	X	X	X	X	X	X	X	X
Chelonia mydas	Green sea turtle	T	T	Terrestrial: sandy beaches; nesting	X	X	X	X	X	X	X	X	X	
Crocodylus acutus	American crocodile	FT	T	Estuarine: herbaceous wetland Riverine: river, creek, low gradient, medium river, pool, spring/spring brook; Lacustrine: shallow water										X
Dermochelys coriacea	Leatherback sea turtle	FE	E	Terrestrial: sandy beaches; nesting	X	X	X	X	X	X	X	X	X	
Drymarchon corais couperi	Eastern indigo snake	FT	T	Terrestrial: mesic flatwoods, upland pine forest, sandhills, scrub, scrubby flatwoods, rockland hammock, ruderal	X	X	X	X	X	X	X	X	X	X
Eretmochelys imbricata	Hawksbill sea turtle	FE	E	Terrestrial: sandy beaches, nesting					X	X	X	X		
Gopherus polyphemus	Gopher tortoise	T	C	Terrestrial: sandhills, scrub, scrubby flatwoods, xeric hammocks, coastal	X	X	X	X	X	X	X	X	X	X

Scientific Name	Common Name	State Status	Federal Status	Natural Communities/ Habitat Type	Coastal Barrier Island System	Perdido Bay	Pensacola River/ Bay	Choctawhatchee River/Bay	St. Andrew Bay	Apalachicola River/Bay	Ochlockonee River/Bay	St. Marks River & Apalachee Bay	Suwannee River/ Bay	Charlotte Harbor
				strand, ruderal										
Graptemys barbouri	Barbour's map turtle	T	P	Palustrine: floodplain stream, floodplain swamp; Riverine: alluvial stream				X	X	X	X			
Lampropeltis extenuate	Short tailed snake	T	N	Terrestrial: scrub, xeric hammock, sandhill									X	
Lepidochelys kempii	Kemp's ridley sea turtle	E	E	Terrestrial: sandy beaches; nesting	X	X	X	X	X	X	X	X	X	X
Macrochelys suwanniensis	Suwannee alligator snapping turtle	SSC	N	Lacustrine: rivers, lakes, backwater swamps, and periodically in brackish systems									X	
Macrochelys temminckii	Alligator snapping turtle	SSC	P	Estuarine: tidal marsh Lacustrine: river floodplain lake, swamp lake Riverine: alluvial stream, blackwater stream		X	X	X	X	X	X	X		
Pituophis melanoleucas mugitus	Florida pine snake	T	P	Lacustrine: ruderal, sandhill upland lake Terrestrial: sandhill, scrubby flatwoods, xeric hammock, ruderal		X	X		X	X	X	X	X	
Birds														
Ammodramus maritimus juncicola	Wakulla seaside sparrow	T	N	Estuarine: tidal marshes						X	X	X		
Ammodramus maritimus peninsulae	Scott's seaside sparrow	T	N	Estuarine: tidal marshes				X	X	X	X	X	X	
Aphelocoma coerulescens	Florida scrub jay	T	T	Terrestrial: scrub, scrubby flatwoods									X	X
Athene cunicularia floridana	Florida burrowing owl	T	N	Terrestrial: grassland/herbaceous, sand/dune		X	X						X	X
Calidris canutus rufa	Red knot	T	T	Estuarine: bays, tidal flats, salt marshes Terrestrial: sandy beaches Marine: aerial, near shore		X	X	X	X	X	X	X		X
Caracara cheriway	Crested caracara	T	T	Terrestrial: prairies, flatwoods,										X

Scientific Name	Common Name	State Status	Federal Status	Natural Communities/ Habitat Type	Coastal Barrier Island System	Perdido Bay	Pensacola River/ Bay	Choctawhatchee River/Bay	St. Andrew Bay	Apalachicola River/Bay	Ochlockonee River/Bay	St. Marks River & Apalachee Bay	Suwannee River/ Bay	Charlotte Harbor
				cabbage palm savanna										
Charadrius alexandrius	Snowy plover	T	CE	Estuarine: exposed unconsolidated substrate Marine: exposed unconsolidated substrate Terrestrial: dunes, sandy beaches, and inlet areas.	X	X	X	X	X	X	X	X		
Charadrius melodus	Piping plover	T	T(CH)	Estuarine: exposed unconsolidated substrate Marine: exposed unconsolidated substrate Terrestrial: dunes, sandy beaches, and inlet areas; mostly wintering and migrants	X	X	X	X	X	X	X	X	X	X
Cistothorus palustris marianae	Marian's marsh wren	T	N	Estuarine: tidal marshes	X		X	X	X	X	X	X	X	
Egretta caerulea	Little blue heron	T	N	Estuarine: herbaceous wetland, lagoon, scrub-shrub wetland, tidal flat/shore Riverine: low gradient Lacustrine: shallow water Palustrine: forested wetland, herbaceous wetland, riparian, scrub-shrub wetland	X	X	X	X	X	X	X	X	X	X
Egretta rufescens	Reddish egret	T	CE	Estuarine: tidal swamp, depression marsh, bog, marl prairie, wet prairie Lacustrine: flatwoods/prairie lake, marsh lake Marine: tidal swamp	X			X	X		X	X		
Egretta tricolor	Tricolored heron	T	N	Estuarine: bay/sound, herbaceous wetland, lagoon, river mouth/tidal river, scrub-shrub wetland, tidal flat/shore Riverine: low gradient Lacustrine: shallow water Palustrine: forested wetland, herbaceous wetland, riparian	X	X	X	X	X	X	X	X	X	X

Scientific Name	Common Name	State Status	Federal Status	Natural Communities/ Habitat Type	Coastal Barrier Island System	Perdido Bay	Pensacola River/ Bay	Choctawhatchee River/Bay	St. Andrew Bay	Apalachicola River/Bay	Ochlockonee River/Bay	St. Marks River & Apalachee Bay	Suwannee River/ Bay	Charlotte Harbor
Falco sparvarius paulus	Southeastern American kestrel	T	CE	Estuarine: various habitats Palustrine: various habitats Terrestrial: open pine forests, clearings, ruderal, various				X	X		X	X	X	X
Grus canadensis pratensis	Florida sandhill crane	T	N	Lacustrine Habitat(s): Shallow water Palustrine Habitat(s): Herbaceous wetland, Riparian; Terrestrial Habitat(s): Grassland/herbaceous, Savanna	X						X		X	X
Haematopus palliates	American oystercatcher	T	N	Estuarine: tidal flat/shore Terrestrial: bare rock/talus/scree, sand/dune	X			X	X	X	X	X	X	
Haliaeetus leucocephalus	Bald eagle	N	BGEPA	Estuarine: marsh edges, tidal swamp, open water Lacustrine: swamp lakes, edges Palustrine: swamp, floodplain Riverine: shoreline, open water Terrestrial: pine and hardwood forests	X	X	X	X	X	X	X	X	X	
Mycteria americana	Wood stork	T	T	Estuarine: marshes Lacustrine: floodplain lakes, marshes (feeding); Palustrine: marshes, swamps, roadside ditches	X	X	X	X	X	X	X	X	X	X
Pandion haliatus	Osprey	SSC	N	Marine: near shore Estuarine: bay/sound, herbaceous wetland, lagoon, river mouth/tidal river Riverine: big river, medium river Lacustrine: deep water, shallow water Palustrine: forested wetland, riparian Terrestrial: cliff				X	X	X	X	X		
Picoides borealis	Red-cockaded woodpecker	E	E	Terrestrial: mature pine forests	X	X	X	X	X	X	X	X	X	X

Scientific Name	Common Name	State Status	Federal Status	Natural Communities/ Habitat Type	Coastal Barrier Island System	Perdido Bay	Pensacola River/ Bay	Choctawhatchee River/Bay	St. Andrew Bay	Apalachicola River/Bay	Ochlockonee River/Bay	St. Marks River & Apalachee Bay	Suwannee River/ Bay	Charlotte Harbor
Platalea ajaja	Roseate spoonbill	T	N	Estuarine Habitat(s): Bay/sound, Herbaceous wetland, Lagoon, Scrub-shrub wetland, Tidal flat/shore; Riverine Habitat(s): Low gradient Lacustrine Habitat(s): Shallow water; Palustrine Habitat(s): Forested Wetland, Herbaceous Wetland, Riparian	X						X			X
Rhynchops niger	Black skimmer	T	N	Marine: near shore Estuarine: bay/sound, herbaceous wetland, lagoon, river mouth/tidal river, tidal flat/shore Riverine: big river, low gradient Lacustrine: deep water, Shallow water Palustrine: riparian Terrestrial: sand/dune	X	X		X	X	X	X	X		
Rostrhamus sociabilis	Florida snail kite	E	E	Palustrine: wet flatwoods, scrub shrub swamps, marsh; Lacustrine: ponds, lake fringe.										X
Sterna antillarum	Least tern	T	N	Estuarine: various Lacustrine various Riverine: various Terrestrial: beach dune, ruderal. Nests common on rooftops	X	X		X	X	X	X	X	X	
Mammals														
Eumops glacinus floridanus	Florida bonneted bat	E	E	Palustrine and Terrestrial										X
Microtus pennsylvanicus dukecampbelli	Salt marsh vole	E	E	Estuarine: tidal marsh, marine tidal marsh									X	
Myotis grisescens	Gray bat	E	E	Palustrine: caves, various Terrestrial: caves, various				X	X	X	X	X		
Myotis sodalis	Indiana bat	E	E	Palustrine and Terrestrial				X	X	X				

Scientific Name	Common Name	State Status	Federal Status	Natural Communities/ Habitat Type	Coastal Barrier Island System	Perdido Bay	Pensacola River/ Bay	Choctawhatchee River/Bay	St. Andrew Bay	Apalachicola River/Bay	Ochlockonee River/Bay	St. Marks River & Apalachee Bay	Suwannee River/ Bay	Charlotte Harbor
Peromyscus polionotus aliophyrs	Choctawhatchee beach mouse	E	E(CH)	Terrestrial: beach dune, coastal scrub				X	X					
Peromyscus polionutus peninsularis	St. Andrews beach mouse	E	E	Terrestrial: beach dune, coastal scrub				X	X	X				
Peromyscus polionotus trissyllepsis	Perdido Key Beach Mouse	E	E(CH)	Terrestrial: Grassland/herbaceous, Sand/dune	X	X	X							
Puma concolor coryi	Florida panther	E	E	Terrestrial: woodland, flatwoods, savanna, prairie										X
Sciuris niger shermanii	Sherman's fox squirrel	SSC	N	Terrestrial: woodland – conifer, woodland-mixed				X	X	X	X	X	X	X
Trichechus manatus latirostris	West Indian Manatee	T	T	Estuarine: submerged vegetation, open water Marine: open water, submerged vegetation	X	X	X	X	X	X	X	X	X	X
Canis rufus	Red wolf	E	E	Terrestrial: woodland, flatwoods, savanna, prairie	X									

BGEPA = Bald and Golden Eagle Protection Act; **C** = Candidate; **CE** = Consideration Encouraged (from SWIM Plans); **CH** = designated Critical Habitat in watershed; **E** = Endangered; **T=** threatened; **N** = Not listed; **P** = Petitioned for Federal Listing; **SAT** = Threatened due to Similarity of Appearance; **SSC**: Species of Special Concern; * = Federally listed but not under the authority of the state of Florida.

Appendix F. Environmental Evaluation Worksheet

U.S. Department of Agriculture — NRCS-CPA-52
Natural Resources Conservation Service — 4/2013

ENVIRONMENTAL EVALUATION WORKSHEET

A. Client Name:

B. Conservation Plan ID # (as applicable)**:**
Program Authority (optional)**:**

C. Identification # (farm, tract, field #, etc. as required)**:**

D. Client's Objective(s) (purpose):

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).

I. Effects of Alternatives

F. Resource Concerns and Existing/ Benchmark Conditions (Analyze and record the existing/benchmark conditions for each identified concern)	***No Action*** **Amount, Status, Description** *(Document both short and long term impacts)*	**√ if does NOT meet PC**	***Alternative 1*** **Amount, Status, Description** *(Document both short and long term impacts)*	**√ if does NOT meet PC**	***Alternative 2*** **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 FLTIG 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