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CHAPTER 10: PROPOSED PHASE III EARLY RESTORATION PROJECTS: MISSISSIPPI

10.1 Introduction

The *Deepwater Horizon* (DWH) spill had a large impact on Mississippi's natural resources and resulted in damage to those resources in addition to a loss of recreational services and ecological services provided by these natural resources. Mississippi, along with the other Trustees, is beginning a restoration process that includes projects designed to compensate for damages to natural resources and the services that those resources provide to the ecosystems or to humans. Following the Spill, the Mississippi Trustee engaged stakeholders including coastal municipal and county governments, non-governmental organizations, state and regional agencies, and the public through a variety of public outreach and coordination efforts to discuss NRDA, the restoration planning process, and potential restoration projects related to the Spill. Meetings are summarized In Section 2.1.5 of this document. In addition, the Trustee met with stakeholders to provide information and solicit suggestions.

As a result of these outreach efforts, Mississippi compiled a list of potential projects for restoration of injured natural resources and services, including recreational loss services. More than 270 project ideas have been received and have been evaluated for Early Restoration[1]. The Mississippi Trustee will continue to accept restoration project ideas. To submit a project idea online, or to view project ideas that have already been submitted, please visit http://www.restore.ms. Projects not selected by the Trustees for this phase of Early Restoration planning may be considered for future phases of both early and long-term restoration.

Based on analysis by Mississippi of the selection criteria set forth in the OPA regulations and the Framework Agreement as outlined in Chapter 2, and NOAA screening considerations for federal trust resources (see Chapter 2), the following projects in Mississippi were identified for Phase III Early Restoration (**Error! Reference source not found.**):

1. Hancock County Marsh Living Shoreline Project (jointly with NOAA)
2. Restoration Initiatives at the INFINITY Science Center
3. Popp's Ferry Causeway Park
4. Pascagoula Beach Front Promenade

These projects are consistent with the goal of compensating the public for natural resource injuries resulting from the Spill. The Early Restoration projects proposed in this Programmatic and Phase III Early Restoration Plan and Final Early Restoration Programmatic Environmental Impact Statement (Final Phase III ERP/PEIS) are not intended to fully compensate the public for injuries caused by the Spill. Additional restoration actions would be required.

Within the remainder of this chapter, there is a subsection for each proposed Phase III project. Each project-specific subsection begins with a general description of the project and relevant background information, followed by: 1) a discussion of the project's consistency with project evaluation criteria; 2)

[1] As of May 15, 2014.

a description of planned performance criteria, monitoring, and maintenance; 3) a description of the type and quantity of Offsets BP would receive if the project is selected for implementation; and 4) information about estimated project costs.

Following this project information is a project-specific environmental review, which provides information about the project's affected environment and analysis about anticipated environmental consequences of the proposed project. Although each of the proposed projects is consistent with the Trustees' preferred Programmatic Alternative (Alternative 4) identified and evaluated in previous sections of this document (Chapters 5 and 6), the Trustees also have undertaken project-specific environmental reviews to help ensure proposed project locations, methods, timing, and other factors to reasonably maximize project benefits, minimize potential adverse consequences, and otherwise address environmental compliance needs.

A cumulative impacts analysis follows the environmental review for all of Mississippi's projects. The cumulative impacts section analyzes how current environmental and socioeconomic conditions may be affected by the proposed actions when their impacts are considered with past, present and reasonably foreseeable future actions.

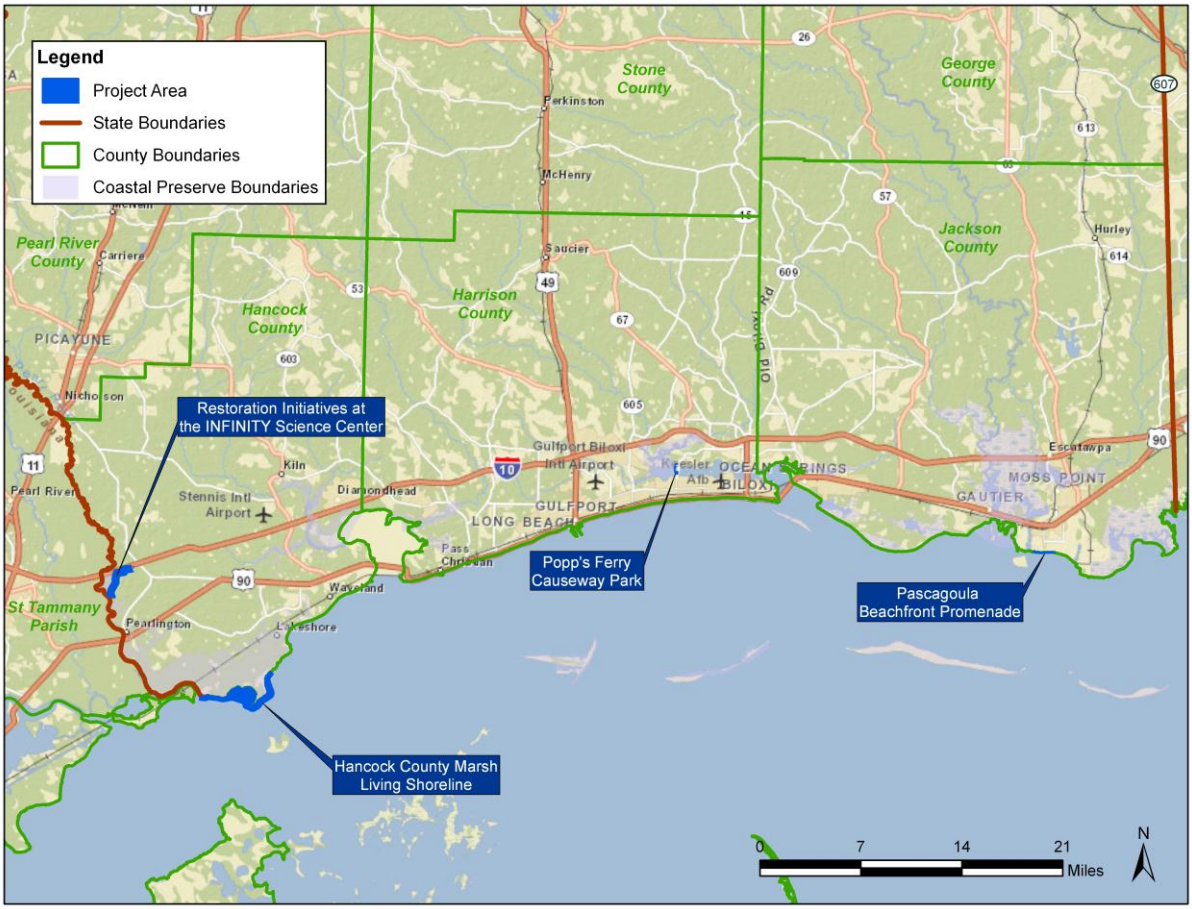

Figure 10-1. Location of Mississippi Phase III Early Restoration projects.

10.2 Hancock County Marsh Living Shoreline Project: Project Description

10.2.1 Project Summary

The proposed Hancock County Marsh Living Shoreline project is intended to employ living shoreline techniques including natural and artificial breakwater material and marsh creation to reduce shoreline erosion by dampening wave energy while encouraging reestablishment of habitat that was once present in the region. The project would provide for construction of up to 5.9 miles of living shoreline, approximately 46 acres of marsh creation, and 46 acres of subtidal oyster reef would be created in Heron Bay to increase secondary productivity in the area. The project would include shoreline erosion reduction, creation of habitat for secondary productivity, and protection and creation of salt marsh habitat. The estimated cost for this project is $50,000,000.

10.2.2 Background and Project Description

The Hancock County Marsh Living Shoreline project is located in western Hancock County, Mississippi, between Bayou Caddy and the mouth of the East Pearl River (Figure 10-2). The 20,909-acre Hancock County Marsh complex, one of the largest in Mississippi, is part of the extensive Pearl River estuary and is partially owned and managed by the Mississippi Department of Marine Resources (MDMR) as part of the Coastal Preserves of the State of Mississippi. Historically, there were extensive, prolific reefs of the American oyster (*Crassostrea virginica*) in the shore zone and nearshore areas of lower Hancock County that provided natural protection from shoreline erosion. Historical erosion rates, particularly at St. Joseph's Point, make this shoreline a priority for protection and marsh creation. The breakwater component of the living shoreline would help protect the existing Hancock County Marsh complex that includes estuarine and estuarine marine deepwater habitats, estuarine and estuarine marine wetlands, freshwater emergent wetlands, and freshwater forested and scrub shrub wetlands.

Breakwaters would be constructed along the marsh shoreline in two locations: from the Pearl River to the western limit of Heron Bay (western reach) and from the eastern limit of Heron Bay to approximately four miles to the northeast toward (eastern reach) approximately 1.86 miles past the heel St. Joseph's Point. Construction activities could include placement of linear structures that may utilize artificial and/or shell-based materials within the -3 to -5 foot (ft.) Mean Lower Low Water (MLLW) contour. Approximately 46 acres of marsh would be constructed in the St. Joseph's Point area to protect and restore marsh areas that experience the historical rates of erosion. A total of 46 acres of subtidal oyster reef would be created using oyster shell in northeastern Heron Bay to protect the shallow embayment and to increase oyster production in the area.

10.2.3 Evaluation Criteria

This project meets the evaluation criteria for the Framework Agreement and OPA. The project would restore injured salt marsh and lost benthic secondary productivity resulting from the Spill in an effort to make the environment whole by restoring, rehabilitating, replacing, or acquiring comparable natural resources injured by the Spill (Section 7.1; Table 7.1). The nexus to resources injured by the Spill is clear (see C.F.R. § 990.54(a) (2) and Sections 6(a)-(c) of the Early Restoration Framework Agreement). The project is technically feasible and utilizes proven techniques with established methods and documented results. Government agencies have successfully implemented similar projects in the region. For these reasons, the project has a high likelihood of success. Further, cost estimates are based on similar past projects, and the project can be conducted at a reasonable cost (see C.F.R. § 990.54(a) (1) and (3) and

Section 6e of the Early Restoration Framework Agreement). A thorough environmental review, including review under applicable environmental statutes and regulations, is described in section 10.3, indicates that adverse effects from the project would largely be minor, localized, and often of short duration. In addition, the best management practices and measures to avoid or minimize adverse effects described in 10.3 would be implemented. As a result, collateral injury would be avoided and minimized during project implementation (construction and installation and operations and maintenance) (15 C.F.R. § 990.54(a)(4)). The project is not inconsistent with long-term restoration needs and was included in *The Project Management Plan for Beneficial Use Projects along Coastal Mississippi* (CH2MHill 2011), which includes shoreline restoration in the Hancock County Marsh Preserve (see Section 6d of the Early Restoration Framework Agreement). The project would not adversely affect public health and safety; see Sections 3.3.6 and 10.2.6.15 of this document. The Hancock County Marsh Living Shoreline project, along with other similar type projects located across the Gulf of Mexico, was submitted as a restoration project on the NOAA website (http://www.gulfspillrestoration.noaa.gov).

Figure 10-2. Proposed Hancock County Marsh Living Shorelines in the vicinity of the Hancock County Marsh complex.

10.2.4 Performance Criteria, Monitoring and Maintenance

Monitoring would be used to evaluate the restoration objectives of the project: 1) construct reef structures to protect shoreline from erosion and support secondary productivity; 2) restore marsh habitat, and 3) restore oyster reefs to support secondary productivity. Post-construction performance

monitoring is proposed for seven years following completion of the project and would evaluate the project's performance over time with respect to the production and support of organisms on the living shoreline (e.g., secondary productivity) and the performance of the created marsh.

Components of this monitoring may include collecting information with respect to:

- Water quality (e.g., salinity, dissolved oxygen)
- Structural integrity of breakwater structure;
- Height/elevation and area of breakwater structure;
- Consolidation rate of breakwater structure;
- Shoreline profile;
- Shoreline position;
- Bivalve density, size, biomass, and survival;
- Non-bivalve invertebrate density and biomass; and
- Percent cover of marsh vegetation.

This project would incorporate a mix of monitoring efforts to ensure project designs are correctly implemented during construction and would allow for corrective actions to be taken where necessary.

10.2.5 Offsets

For the purposes of negotiation of Offsets with BP in accordance with the Framework Agreement, the Trustees used Resource Equivalency Analysis and Habitat Equivalency Analysis to estimate appropriate biological and habitat Offsets for the Hancock County Marsh Living Shoreline project. Habitat Offsets (expressed in DSAYs) were estimated for salt marsh habitat created and/or protected by this restoration, based on the expected spatial extent and duration of improvements attributable to the project. In estimating DSAYs, the Trustees considered a number of factors, including, but not limited to, anticipated protection of existing marsh provided by the project, new marsh created by the project, the time period it would take for created marsh to provide different levels of ecological benefits, the time period over which the project would continue to provide benefits, and the ecological benefits of created marsh relative to existing marsh habitats that were not affected by the Spill. The Trustees and BP agreed that if this restoration is selected for implementation, BP would receive Offsets of 347.45 DSAYs of Salt Marsh Habitat[2], applicable to Salt Marsh Habitat injuries in Mississippi, as determined by the Trustees' total assessment of injury for the Spill.

[2] **Salt Marsh Habitat** refers to transitional marsh areas between land and water that occur in coastal areas at salinities at or approaching that of ocean water. Typical vegetation in salt marsh habitat includes species such as *Spartina alterniflora*, *Juncus romerianus*, and *Distichlis spicata.*

Benthic Secondary Productivity[3] Offsets (expressed in DKg-Ys[4]) were estimated for expected increases in invertebrate infaunal and epifaunal biomass attributable to the project. In estimating DKg-Ys, the Trustees considered a number of factors, including, but not necessarily limited to, typical productivity in the project area, estimated project lifespan, and project size. The Trustees and BP agreed that if this restoration is selected for implementation, BP would receive Offsets of 1,594,166 DKg-Ys of benthic Secondary Productivity, applicable to benthic Secondary Productivity injuries in Mississippi, as determined by the Trustees' total assessment of injury for the Spill. If these benthic Secondary Productivity Offsets exceed the specified injury, the Trustees and BP will apply "excess" Offsets to benthic Secondary Productivity within federal waters on the continental shelf, excluding those associated with mesophotic reefs. These Offsets would not apply to injuries in Alabama, Florida, Louisiana, and/or Texas.

These Offset types and amounts are reasonable for this project.

10.2.6 Cost

The estimated cost to implement this project is $50,000,000. This cost reflects current cost estimates developed from the most current information available to the Trustees at the time of the project negotiation. The cost includes provisions for planning, engineering and design, construction, monitoring, and potential contingencies.

[3] The strict definition of secondary productivity is the rate of production of consumers (heterotrophs) in an ecosystem (Edmondson & Winberg 1971). For purposes of the offsets for the living shoreline projects, it is more narrowly defined as production of herbivores and detritivores, (the P2 production level in Odum 1959) and in particular, the net production of mobile and sessile invertebrate infauna and epifauna associated with hard bottom substrates.

[4] Discounted kilogram-years of Ash-Free-Dry-Weight

10.3 Hancock County Marsh Living Shoreline Project: Environmental Review

10.3.1 Introduction and Background

The restoration activities proposed for this project would be located in western Hancock County, Mississippi, from the mouth of the Pearl River on the west to approximately 1.86 miles past the heel of St. Joseph's Point, including Heron Bay (Figure 10-3). This marsh complex is part of the extensive Pearl River estuary where the land is largely in public ownership and managed by the Mississippi Department of Marine Resources (MDMR) as part of the Coastal Preserves of the State of Mississippi. The total acreage of the area designated as the Hancock County Marsh Coastal Preserve is 20,909 (Clark 2013). A total of 12,837 acres in Hancock County Marsh Coastal Preserve is owned by the state, with the remainder owned by various other entities or private landowners (Clark 2013). The preserve, which represents one of the largest marsh habitats in Mississippi, consists of marsh, including tidal channels, lagoons, and bays. Historically, extensive and prolific reefs of the American oyster (*Crassostrea virginica*) in the shore zone and nearshore areas of lower Hancock County provided natural protection to the shore from erosion. High erosion rates, particularly at St. Joseph's Point, make this shoreline a priority for protection and marsh creation. The *Project Management Plan for Beneficial Use Projects along Coastal Mississippi* cites this area as a priority project site (CH2MHill 2011).

The Hancock County Marsh Living Shoreline project would include shoreline/marsh protection, marsh creation, subtidal reef restoration, and increased benthic secondary productivity. Specifically, the proposed project consists of three restoration components:

- Use of living shoreline techniques that utilize natural and artificial breakwater material to reduce shoreline erosion by dampening wave energy while encouraging reestablishment of habitat that was once present in the region
- Creation of 46 acres of salt marsh habitat in areas that have experienced high rates of shoreline and marsh habitat erosion
- Placement of 46 acres of oyster cultch in areas that have historically supported oyster habitat

In order to assess the impact on the environment, the project is described based on the current design concept. Final engineering and design could result in revisions to the project. The following is intended to be a conservative description of the project components in order to evaluate a maximum environmental impact during the National Environmental Policy Act (NEPA) review environmental permitting. Project refinement(s) are anticipated as part of the design process. To the extent possible, revisions would be restricted to the current project footprint.

10.3.1.1 Living Shorelines

Breakwaters

For this project, the living shoreline approach includes constructing breakwaters made of limestone with oyster shell veneer that provides erosion control benefits and enhances natural shoreline habitat. A breakwater can be defined as linear structures that may utilize artificial and/or shell-based materials placed parallel to the shore in medium- to high-energy open-water environments for the purpose of

dissipating wave energy to reduce shoreline erosion. The breakwaters would be constructed at two locations: along St. Joseph's Point (eastern reach) and from Pearl River to Heron Bay (western reach).

Figure 10-3. Conceptual Hancock County Marsh Living Shoreline project components.

- **St. Joseph's Point Breakwater (eastern reach):** The conceptual design for the breakwater would be approximately four miles long, extending from Heron Bay to approximately four miles to the northeast, which includes openings throughout, with a crest width of approximately 15.0 ft. and total height of approximately 4.0 ft. (to +0.87 ft., North American Vertical Datum [NAVD]). The breakwater would have a footprint of approximately 14.4 acres and would be placed on a substrate of fine-grained sediment. It would be composed of a core of riprap and some or all could be covered by a 9-inch-thick layer of bagged oyster shell.
- **Pearl River to Heron Bay Breakwater (western reach):** This conceptual breakwater would be approximately 1.9 miles long, with openings throughout, with a crest width of 15.0 ft. and a total height of approximately 4.0 ft. (to +0.87 ft., NAVD). Its design and sediment substrate are to be similar to the St. Joseph's Point breakwater. The Pearl River to Heron Bay breakwater project area footprint would be approximately 5.5 acres, consisting of fine-grained sediment. The conceptual design is subject to refinement.

10.3.1.2 Creation of Marsh in the Vicinity of St. Joseph's Point

In addition to the breakwaters, the living shoreline approach would include creating a total of 46 acres of salt marsh in one to several locations. Salt marshes are defined as transitional marsh areas between land and water that occur in coastal areas at salinities at or approaching that of ocean water. Typical vegetation in salt marsh habitat includes species such as smooth cordgrass (*Spartina alterniflora*), black needlerush (*Juncus romerianus*), and saltgrass (*Distichlis spicata*). The area behind the constructed breakwater at St. Joseph's Point would be backfilled with dredged material and allowed to re-vegetate by natural colonization of estuarine marsh species. Dredged fill material would be obtained through the Mississippi Beneficial Sediment Use Program as available or excavated from a suitable borrow source. Dredged material would be hydraulically placed to obtain the target elevation.

10.3.1.3 Placement of Oyster Reef Cultch in Heron Bay

In addition to the living shoreline components, oyster cultch would be deployed over 46 acres in Heron Bay in areas that currently support or previously supported oyster production. Oyster reefs are typically colonial aggregations of living oysters and other bi-valves that can have subtidal as well as intertidal portions and that provide habitat for a community of other species. Oyster cultch deployment would occur generally in water depths of approximately -3 to -5 ft. MLLW. The reef(s) would be sited based on data gathered from an oyster presence survey and would consist of an approximately 6- to 9-inch-thick layer of oyster shell or limestone placed on the marsh platform.

10.3.2 Project Location

The proposed project is located in Hancock County, Mississippi (Bounding Coordinates: West -89.530339 W, 30.184 N; South: -89.462 W, 30.169 N; East: -89.415 W, 30.233 N; North: -89.53 W, 30.184 W. Centroid = -89.457 W, 30.19 N). The Hancock County Marsh Preserve is managed by the MDMR and is the second largest continuous marsh area in the state. The preserve includes adjoining marshlands bordering the Mississippi Sound from the Pearl River to St. Joseph's Point. The project area includes the shoreline of the Hancock County marsh from the mouth of the Pearl River on the west to approximately 1.86 miles past the heel of St. Joseph's Point, including Heron Bay. On the seaward side, the project area extends approximately to the -8 ft. contour from the proposed breakwater to incorporate potential impacts from temporary flotation channels that would be utilized by work barges during construction.

10.3.3 Construction and Installation

Construction methods and activities are included in order to assess the impact on the environment. Actual construction methods and activities would be determined after final design and would likely be comparable to activities described below. It is expected that actual construction methods would be similar to those presented in this section.

10.3.3.1 Living Shorelines

Breakwaters

The specific breakwater construction elevation was selected to maximize shoreline protection (see Table 10-1). Construction could include placement of linear structures that would utilize artificial and/or shell-based materials. The alignment and limits of the breakwaters would be surveyed; the outer limits of the breakwaters would be marked with poles driven into the bottom and extended approximately 3 ft. above the water surface. The height of the breakwaters along the alignment would be constructed

based on bottom elevations and the anticipated crest elevation (0.87 ft. NAVD 88 – Mean Tide Level). Barriers, navigation warning signs (lighted and unlighted), and other safety devices would be installed along the work area to protect boaters.

Table 10-1. Preliminary Breakwater specifications for the Hancock County Marsh Living Shoreline project.

Breakwater Design Data	St. Joseph's Point Breakwater (eastern reach)	Pearl River to Heron Bay Breakwater (western reach):
Total project length	Approx. 4 miles	Approx. 1.9 miles
Total project acreage	14.4 acres	5.5 acres
Crest width	15.0 ft.	15.0 ft.
Base width	30 ft.	30 ft.
Assumed bottom elevation	-3.5 MLLW	-3.5 MLLW
Total structure height	3.75 ft.	3.75 ft.
Bagged shell veneer thickness	9 inches	9 inches
Riprap core volume	51,600 cubic yards	16,900 cubic yards
Bagged shell volume	16,400 cubic yards	6,300 cubic yards
Depth of material (riprap/marine mattress)	3 ft.	3 ft.
Estimated initial settlement	1 ft.	1 ft.
Design side slopes	2v:1h	2v:1h
Breakwater distance from shoreline	30 – 90 ft.	30 – 90 ft.
Reach of each breakwater	75 ft.	75 ft.
Length of each gap between breakwater	25 ft.	25 ft.

The dimensions for the breakwaters would be approximately 30 ft. wide at the base and approximately 15 ft. wide at the crest (Table 10-2).

The riprap core of the breakwaters would either be constructed using loose boulders or "marine mattresses," which would consist of 2- to 6-inch-diameter rocks assembled on land. The core material would be transported to the work area on barges and installed by a crane located on a separate barge. Placement of the riprap core would be monitored to ensure the breakwater dimensions, slopes, and crest elevations are achieved. After installation of the riprap core, some or all could be covered with bags of shell. The deployment of the breakwaters may extend over a period of ten to twelve months; major construction activities to the extent practicable, would be limited to the months of May to October after sturgeon have migrated to their riverine habitat. If work continues beyond the May to October window, continued adherence to the Sea turtle and Smalltooth Sawfish Construction Conditions (NMFS, 2006) will minimize the potential for impacting Gulf Sturgeon. Total installed volumes would be as follows:

- ***St. Joseph's Point Breakwater (eastern reach):*** The target depth for deployment is approximately -3.5 ft. MLLW, but could be between -3.0 and -5.0 ft. MLLW. The volume of placed material would be approximately 51,600 cubic yards of riprap and 16,400 cubic yards of shell. The breakwater would cover a footprint of approximately 14.4 acres of fine-grained sediment.

- ***Pearl River to Heron Bay Breakwater (western reach):*** The target depth for deployment is approximately -3.5 MLLW, but could be between -2.0 ft. and -5.0 ft. MLLW. The volume of placed material would be approximately 16,900 cubic yards of riprap and 6,300 cubic yards of shell. The breakwater would cover a footprint of approximately 5.5 acres of fine-grained sediment.

The project is designed to use temporary flotation channels (Table 10-2) to facilitate access for work barges into the work area. A channel would be excavated parallel to the alignments of the two breakwaters (Figure 10-3). Additional channels would be excavated perpendicular to these channels to provide access from the Mississippi Sound to allow work barges entry and exit for the project area. The excavated dredged material would be cast on the seaward side of the channels so they naturally fill back in after construction. The depth of the channels would be 8 ft. below MLLW to accommodate barge draft. The bottom width of the channels would be approximately 80 ft. with 3H:1V side slopes. The entry locations for the channels would be determined by analyzing the shortest distance from the breakwaters to the appropriate depth of -8 ft. and excavated using best management practices (BMPs) to minimize environmental impacts. For the purposes of project planning, the preliminary temporary flotation channel footprint was calculated based on an estimate of a heavily loaded barge. Proposed temporary flotation channel dimensions are summarized in Table 10-2.

Table 10-2. Preliminary temporary flotation channel footprint for the Hancock County Marsh Living Shoreline project.

COMPONENT	DIMENSION
Channel Length	55,008 ft.
Barge Draft	8 ft.
Channel Width	80 ft.
Area Temporarily Impacted	101 acres

After completion of construction, the breakwater structure would be surveyed and permanent navigation signs would be installed in accordance with safety requirements.

10.3.3.2 Creation of Marsh in the Vicinity of St. Joseph's Point

After the breakwater along St. Joseph's Point has been installed, selected areas landward of the breakwater would be filled with dredged material obtained from the MDMR Beneficial Use of Sediment Program if material is available, or a suitable borrow source. It is anticipated that a dike would be constructed at the seaward extent of the marsh. Upon location of suitable material, the dike would be constructed by excavating existing material from the landward side of the proposed dike location, but not borrowing from the existing marsh. Once an area of the marsh is diked, the area landward of the dike would be filled with dredged material until final marsh grades are achieved. Sediment would be pumped through a floating pipeline from a hydraulic dredge located where suitable fill material is available. Pumps and sediment controls would remain in place throughout the dredging and filling process and after initial settling has occurred. Once the entire marsh area(s) is constructed, the area would be monitored for natural re-vegetation.

10.3.3.3 Placement of Oyster Cultch in Heron Bay

Oyster cultch would be deployed in Heron Bay in water depths of -3 to -5 ft. MLLW in areas that currently support or previously supported oyster production. An oyster presence survey has been completed that identified suitable areas. The cultch would be deployed as a high-profile 6- to 9-inch-thick layer of oyster shell or limestone. Prior to deployment, the limits of the oyster cultch deployment area(s) would be marked with buoys or poles. Oyster shells would be deployed by a barge-mounted crane with a clam shell bucket. A material barge loaded with oyster shells would be moored to the crane barge. As a construction alternative, water jetting of loose shell off of a material barge may be used in case of water-depth constraints. Upon completion, the deployment area would be surveyed.

10.3.4 Best Management Practices

Throughout the design process, every practical attempt would be made to avoid and minimize potentially adverse environmental, social, and cultural impacts. The BMPs and conservation measures that would be utilized to minimize impacts to resources are listed in Section 10.3.7, Summary and Next Steps.

10.3.5 Operations and Maintenance

10.3.5.1 Anticipated Pre- and Post-construction Monitoring Activities

Monitoring activities would be performed prior to construction and for up to seven years after construction. Monitoring activities would include:

- Topographic/bathymetric surveys
- Vegetation surveys (species composition and percent cover)
- Oyster and other invertebrate monitoring (density and biomass)

The project would incorporate a mix of monitoring efforts to ensure project designs are correctly implemented during construction. Monitoring efforts would occur in a subsequent period, where corrective action could be taken.

Post-construction performance monitoring would be conducted to observe the performance of the physical breakwater structures (breakwater height, structural integrity, settling rate, etc.) and marsh (elevation, settling rate, etc.) to allow for corrective action as needed or as defined by the Trustees.

Post-construction performance monitoring would also evaluate the project's performance over time with respect to the agreed-upon restoration goals and objectives. Specifically, this monitoring would evaluate the production and support of organisms on the breakwater (e.g., secondary productivity) and the performance of the created marsh and the reduced erosion rate of the existing shoreline. Monitoring parameters would include the following: water quality (e.g., salinity, dissolved oxygen), vegetative monitoring, and invertebrate infauna and epifauna composition and biomass.

10.3.5.2 Anticipated short-term maintenance activities

Within four years following construction, it may be necessary to add more riprap or shell material on the breakwater structure as a maintenance activity. The breakwater is anticipated to experience the greatest consolidation of the subgrade in the first years following construction. The need for additional placement of rock and/or shell on the breakwater would be assessed during the regular monitoring.

Maintenance construction methods would be similar to the construction methods of the original breakwater structure.

10.3.6 Affected Environment and Environmental Consequences

Under the NEPA, federal agencies must consider environmental effects of their actions that include, among others, impacts on social, cultural, and economic resources, as well as natural resources. The following sections describe the affected resources and environmental consequences of the project.

In order 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 their 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.

10.3.6.1 No Action

Both OPA and NEPA require consideration of the No Action alternative. For this Final Phase III ERP proposed project, the No Action alternative assumes that the Trustees would not pursue the Hancock County Marsh Living Shoreline as part of Phase III Early Restoration.

Under the No Action alternative, the existing conditions described for the project site in the affected resources subsection would prevail. Restoration benefits associated with this project would not be achieved at this time.

10.3.6.2 Physical Environment

Geology and substrates, hydrology, water quality, air quality, greenhouse gas emissions, and noise will be discussed in this section.

10.3.6.3 Geology and Substrates

Affected Resources

Geology

The project area is located within the Gulf Coastal Plain and the Mississippi Alluvial Plain physiographic regions. Landforms are generally comprised of Holocene sediments. These sediments are composed of sand, silt, and clay with comparatively high organic matter content (Schmid 2013a). Recent geotechnical sampling within the project footprint observed soft silty clays with an interbedded layer of loose silty sands from East Pearl River to Heron Bay. From Heron Bay eastward, the sediments consisted primarily of soft silty clays.

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

Substrates

The shoreline within the Hancock County Marsh Coastal Preserve has been receding for many years mainly due to wave erosion. Schmid (2013b) determined that the shoreline regression rate from 1850 to

2001 was an average of one meter per year, although rates varied locally (Figure 10-4). For example, the area from Three Oaks Bayou to Heron Bay Point receded at a rate higher than one meter per year. This area is important because once it is breached, shoreline erosion will likely increase along Heron Bay. Schmid (2013b) also estimated an annual shoreline loss of approximately 6.2 acres. Thus, over the next 25 years, between 200 and 500 acres in the Hancock County marsh are at risk. An accelerated rate of sea level rise would result in further losses of marsh habitat. Additionally, shoreline regression has been exacerbated as a result of marsh injury stemming from the Spill.

Environmental Consequences

During construction of the breakwater, marsh, and oyster cultch deployment, the fine-grained soft-bottom habitat would be altered by the placement of breakwater materials and oyster shell. The footprint of the combined project is approximately 212.9 acres. Approximately 111.9 acres would be filled for construction of project elements including breakwater construction (19.9 acres), marsh creation (46 acres), and oyster reef creation (46 acres), resulting in a long-term, moderate impact to a relatively small project footprint. In addition, the temporary flotation channels would be constructed to transport the barges carrying the fill material (approximately 101 acres). The sidecast material from the construction of the temporary flotation channels would temporarily alter the seafloor morphology until waves naturally push the sidecast material back into excavated channels after construction. To the extent possible, materials from the temporary flotation channel may be used beneficially to create marsh. Adverse impacts to the submerged substrate during construction are expected to be short term and minor.

The placement of breakwater along 5.9 miles of shoreline and marsh creation/shoreline protection zone between the breakwater and the existing shore would reduce the wave energy, thereby slowing shoreline and marsh erosion and resulting in the long-term protection of the entire Hancock County Marsh Preserve. Therefore, the project would have a long-term beneficial impact on shoreline soils, geology, and substrate.

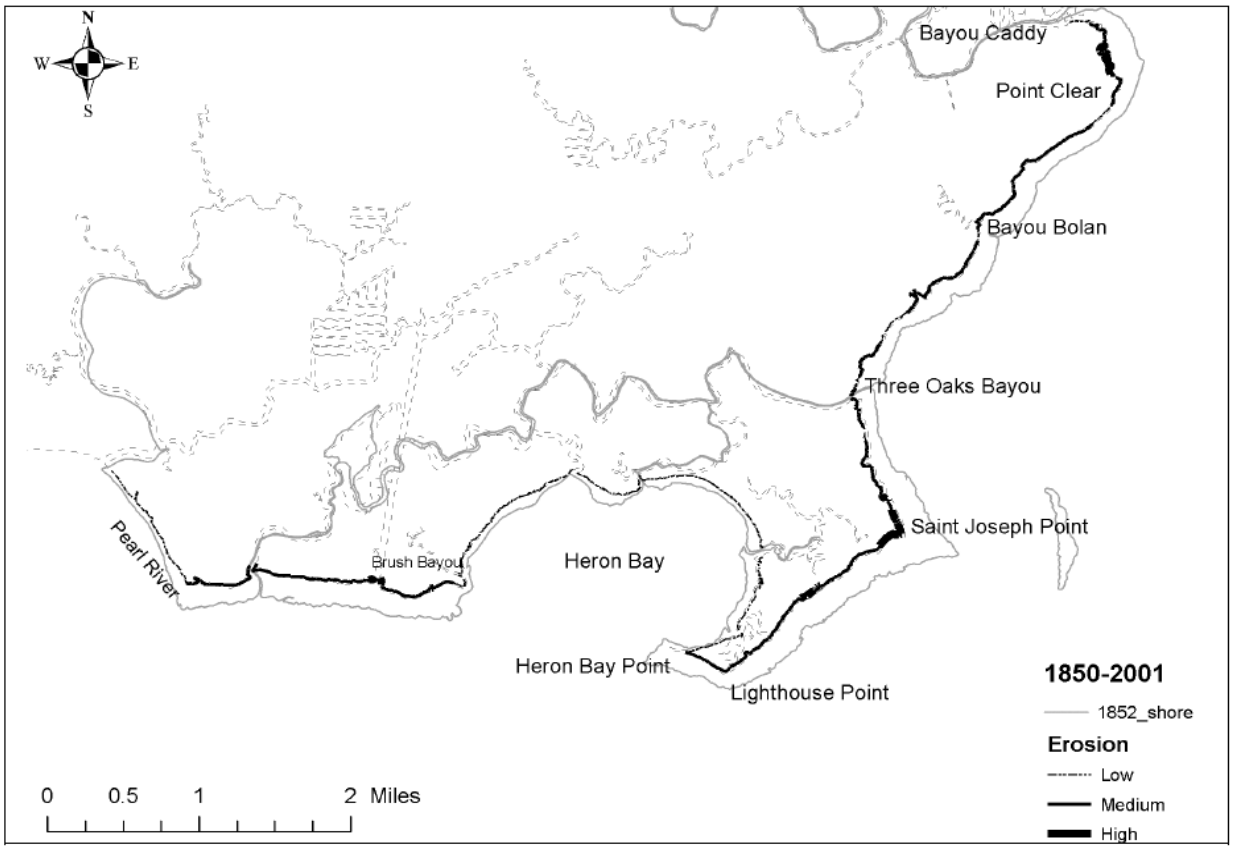

Figure 10-4. Shoreline erosion rates from 1850 to 2001 (Schmid 2013b).

Findings: There would be long-term, moderate adverse impacts to geologic and soil (substrates) resources (approximately 111.9 acres) over the life of the project because fine-grained sediment would be covered with hard structure and sediment by the creation of breakwaters, marsh, and oyster reefs. There would be short-term minor impacts to approximately 101 acres of fine-grained sediment for the creation of temporary flotation channels. The net benefits of the habitat protection and restoration would include increased benthic habitat diversity, structural complexity, greater diversity, and abundance of marine aquatic species. In addition, the entire Hancock County Marsh Preserve would experience reduced shoreline erosion. Overall, there would be a long-term benefit to geology and substrates in the Hancock County marsh. There would be no long-term adverse impact as a result of excavation of temporary flotation channels.

10.3.6.4 Hydrology and Water Quality

Affected Resources

Hydrology

The affected resources consist of estuarine and marine wetlands and shallow water habitats such as tidal creeks, lagoons, bayous, and bays along the Pearl River estuary, the Hancock County marsh shoreline, and the Mississippi Sound. The area is influenced by freshwater flow from the Pearl River as well as by tidal action from the Mississippi Sound.

The project is located in the Lower Pearl River watershed and the Mississippi Coastal Streams watershed. The Lower Pearl River watershed has a drainage area of approximately 8,760 square miles (PRBDD 2013) and includes portions of St. Tammany and Washington parishes in Louisiana and Hancock, Lamar, Marion, and Pearl River counties in Mississippi. Major tributaries within the Lower Pearl watershed include the Pearl River, Yockanookany River, Lobutcha Creek, Strong River, and Bogue Chitto River.

The Mississippi Coastal Streams watershed drainage area is approximately 1,550 square miles (MDEQ 2012) and includes portions of Lamar, Hancock, Pearl River, Stone, Harrison, and Jackson counties. Major tributaries within the Mississippi Coastal Streams watershed include Bayou Casotte, Wolf River, Rotten Bayou, DeLisle Bayou, Bayou La Croix, Bayou Bacon/Jourdan River, Turkey Creek/Bernard Bayou, Biloxi River, and Tuxachanie Creek.

Water Quality

Mississippi's water quality standards specify the appropriate levels for which various water quality parameters or indicators support a water body's designated use(s). Each use assessed for a water body is determined to be either "Attaining" or "Not Attaining" in accordance with the applicable water quality standards and U.S. Environmental Protection Agency (EPA) guidelines for assessments pursuant to §305(b). A water body's use is said to be impaired when—based on current and reliable site-specific data of sufficient quantity, quality, and frequency of collection—it is not attaining its designated use(s). Where data and information of appropriate quality and quantity indicate non-attainment of a designated use or uses for an assessed water body, the water body will be placed on the Mississippi 2012 Section 303(d) List of Impaired Water Bodies (MDEQ 2012).

The project area is represented by two uses as designated by the state in two watershed basins. These include "recreational use" in both the Coastal Streams and Pearl River Basins and "fish and wildlife use" in the Pearl River Basin. Waters in the fish and wildlife classification are intended for fishing and for propagation of fish, aquatic life, and wildlife. Coastal waters in the recreational classification are to be suitable for recreational purposes, including such water contact activities as swimming and water skiing.

Major rivers such as the Pearl River and the Pascagoula River carry high sediment loads into the Mississippi Sound. Inland fresh water drainage from these and other smaller rivers, as well as St. Louis and Biloxi Bays, create an estuarine environment in the Sound. Variable salinity levels can affect the productivity and survival of organisms living in the Sound, as well as economic and recreational activities. Pollution from agriculture, improperly treated sewage, roadways, accidental spills, industry discharges, and other sources also affect the health of the Mississippi Sound. The Pearl River, from its mouth up to the Bogue Homa, is not listed as impaired on the State of Mississippi 303(d) list.

Tides and Currents
Average tidal range is 1.96 ft.; wind affects local water depth and surface level fluctuations.

A tidal datum is referenced to a fixed point known as a benchmark and is typically expressed in terms of mean high water (MHW), mean low water (MLW), mean tidal levels (MTL) over the observed period of time, and mean low low water (MLLW). MHW is the average of all the high-water heights observed over one tidal epoch. MLW is the average of all the low-water heights observed over one tidal epoch. MTL is the mean of the MHW and MLW for that period of time.

The Bay Waveland Yacht Club gage (Station ID: 8747437) was selected to determine historical water levels, as it is the closest water level gage to the project area. This gage is located at 30° 19.5'N, 89° 19.5'W, approximately 12 miles northeast of the project area. The results of the tidal datum determination are as follows:

- MHW = 1.63 ft. NAVD 88
- MTL = 0.87 ft. NAVD 88
- MLW = 0.10 ft. NAVD 88
- MLLW = 0.00 ft. NAVD 88

Floodplains
The project is located in the Federal Emergency Management Agency (FEMA) designated flood zones according to the Flood Insurance Rate Maps (FIRM) for Hancock County (FEMA 2013). FIRM Panel Numbers within the project area include 28045C0417D, 28045C0428D, 28045C0429D, 28045C0431D, 28045C0433D, 28045C0436D, and 28045C0437D (all with the effective date October 16, 2009). The project is located in Zone VE and the base flood elevation ranges from 25 to 27 ft. Zone VE areas are subject to inundation by the 1-percent-annual-chance flood event with additional hazards due to storm-induced velocity wave action.

Wetlands
The estuarine areas are composed of low, mid, and high marsh zones. In the low marsh areas, regularly flooded by tidal activity, the mesohaline habitat consists of smooth cordgrass (*Spartina alternaflora*). Mesohaline is a measurement of salinity and refers to a water salinity ranging from 8 to 15 parts per thousand (ppt), which means that the salt content in 1 gram of water equals 1/1,000. The intermediate (mid) marsh zone is irregularly flooded by tidal activity and is typically dominated by black needlerush (*Juncus roemerianus*), which can be intermixed with salt grass (*Distichlis spicata*) in oligohaline (salinity of 0.5 to 5.0 ppt) areas. In higher elevation areas, it is not uncommon to observe numerous species intermixed including salt grass, black needlerush, and salt meadow cordgrass (*Spartina patens*).

Environmental Consequences
Environmental consequences affecting hydrology, water quality, tides and currents, wetlands and floodplains are discussed below.

Hydrology
No long-term impacts from the breakwater and the created marsh to the tidal hydrology of Hancock County marsh and surrounding areas are anticipated. Gaps would be present between breakwater segments and created marsh areas that would allow tidal exchange flows and waterway access.

Hydrology would be unaffected because the proposed project would have a minimal footprint and is located adjacent to the shoreline.

Water Quality

Turbidity

Placement of the breakwater, created marsh, and deployment of oyster cultch would result in short-term, minor adverse impacts to water quality as a result of resuspension of sediment by vessels (barges, tugs, skiffs, etc.) moving in and out of the project area, excavation of the temporary flotation channels, and filling of the marsh. The suspended sediment may be transported into surrounding wetlands, waterways, and the Mississippi Sound. However, the area is currently exposed to elevated turbidity levels as a result of resuspension of sediment from river transport and during frequent storms, tides, and other typical weather events. Best management practices along with other avoidance and mitigation measures required by state and federal regulatory agencies, would be employed to minimize potential water quality and sedimentation impacts. U.S. Army Corps of Engineers (USACE) Section 10/404 and State Water Quality Certifications would be required and permit conditions would be adhered to. Impacts from turbidity would be minor, but short term and limited in spatial extent.

Contaminants

In addition to turbidity, the water quality could be adversely impacted by leaks or spills of fuel and lubricants used by vessels and other equipment during the construction of the breakwater, marsh, and oyster cultch deployment. Appropriate BMPs such as routine maintenance, inspection, and proper refueling of construction equipment would be used to prevent, control, and mitigate impacts. Suitable maintenance dredge sediments that have been examined for levels of contamination, consistent with applicable requirements, would be used as fill material in the project area.

Tides and Currents

Tides and the ebb and flow current are influenced mostly by the position of the sun and moon in relation to the earth and, to a small extent, the shape of the shoreline. The general shape of the shoreline would remain the same; therefore, there would be no impacts to tides and currents as a result of the project activities.

Floodplains

The majority of the project is located below the MHW level and would not impact the floodplain in the project area.

Wetlands

Created wetlands would be sited in the area between the breakwater and existing shoreline. Dikes would be constructed and then sediment would be pumped through a floating pipeline until the area reaches final grade. Dike construction would result in no impacts to wetlands. There would be short-term, minor, and localized impacts from sediment placement at the shoreline edge. Natural vegetative colonization of these areas would occur within one to three years and would be expected to mitigate erosion from wind and wave activity in the long term. A total of 46 acres of created marsh would be established in the Hancock County Marsh Preserve. The project would result in long-term beneficial impacts to wetlands in the Hancock County Marsh complex.

The Trustee would apply for a Mississippi Coastal Wetland Protection Act Permit and authorization by the USACE. Under the Coastal Zone Management Act of 1972, selected restoration projects must be consistent to the maximum extent practicable with the federally-approved coastal management programs for the states in which the projects are to be conducted. On December 12, 2013, the Federal Trustees submitted a consistency determination to the MDMR for this project for appropriate state reviews coincident with public review of the Phase III DERP/ER. On February 4, 2014, the MDMR responded and concurred with the federal determination for the project for purposes of finalizing this early restoration plan (Miller 2014).

Coordination with the Corps and final authorization pursuant to Clean Water Act Section 404 and Rivers and Harbors Act (CWA/RHA) will be completed prior to project implementation. The Trustee would adhere to all conditions of the Mississippi Coastal Wetland Protection Act permit and the Clean Water Act permit.

10.3.6.5 Air Quality and Greenhouse Gas Emissions

Affected Resources

The 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), the EPA has promulgated National Ambient Air Quality Standards (NAAQS). Under the CAA, the EPA establishes primary and secondary air quality standards. Primary air quality standards protect the public health, including the health of "sensitive populations, such as people with asthma, children, and older adults." Secondary air quality standards protect public welfare by promoting ecosystems' health and by preventing decreased visibility and damage to crops and buildings. The EPA has set NAAQS for the following six criteria pollutants: ozone, particulate matter (PM 2.5 and 10), nitrogen dioxide (NO_2), carbon monoxide (CO), sulfur dioxide (SO_2), and lead.

Air Quality

Mississippi has adopted the federal standards (Table 10-3). According to the MDEQ, the entire state of Mississippi (including Hancock County) is classified as in attainment, meaning criteria air pollutants do not exceed the NAAQS.

Greenhouse Gases

Greenhouse gases (GHGs) are chemical compounds found in the earth's atmosphere that absorb and trap infrared radiation as heat. Global atmospheric GHG concentrations are a product of continuous emission (release) and removal (storage) of GHGs over time. In the natural environment, this release and storage is largely cyclical. For instance, through the process of photosynthesis, plants capture atmospheric carbon as they grow and store it in the form of sugars. Human activities such as deforestation, soil disturbance, and burning of fossil fuels disrupt the natural cycle by increasing the GHG emission rate over the storage rate, which results in a net increase of GHGs in the atmosphere. The principal GHGs emitted into the atmosphere through human activities are carbon dioxide (CO_2), methane, nitrous oxide, and fluorinated gases (such as hydrofluorocarbons, perfluorocarbons, and sulfur hexafluoride) with CO_2 as the major GHG emitted.

Table 10-3. State and Federal ambient standards for criteria air pollutants.

POLLUTANT	AVERAGING PERIOD	STATE AND FEDERAL PRIMARY STANDARD
Ozone	8-hour	0.075 ppm
	1-hour (daily max.)	0.12 ppm
PM2.5	Annual (arithmetic mean)	15.0 µg/m3
	24-hour	35 µg/m3
PM10	Annual (arithmetic mean)	NA
	24-hour	150 µg/m3
Carbon Monoxide	8-hour	9 ppm
	1-hour	35 ppm
Nitrogen Dioxide	Annual (arithmetic mean)	0.053 ppm
	1-hour	0.100 ppm
Sulfur Dioxide	Annual (arithmetic mean)	0.03 ppm
	24-hour	0.14 ppm
	1-hour (per annum)	NA
	1-hour (per 7 days)	NA
	5-minute	NA
Lead	Rolling 3-month average	0.15 µg/m3
	Quarterly average	1.5 µg/m3
Total Suspended Particulates	Annual (geometric mean)	NA
	24-hour	NA

Environmental Consequences

Air Quality

Project implementation would require the use of heavy equipment, which could temporarily lead to air quality impacts from equipment exhaust. In addition, fine particulate matter (fugitive dust) associated with the oyster cultch may become airborne during the deployment process. No air quality permits are required for this type of project, and violations of state air quality standards are not expected.

Air quality impacts, if any, during construction are expected to be localized, minor, and short term.

Greenhouse Gas Emissions

The use of gasoline and diesel-powered construction vehicles and equipment, including cars, trucks, cranes, crewboats, backhoes, small craft vessels, and tugboats, and other equipment would contribute to an increase in GHG emissions. Table 10-4 details the construction equipment needed to complete the project, the total hours used for each type of equipment, and the emissions resulting from the use of equipment.

Based on the assumptions detailed in Table 10-4, the project would generate approximately 7,152.04 metric tons of GHGs over the duration of all phases. The following mitigation measures have been identified to reduce or eliminate GHG emissions from the project.

- Shut down idling construction equipment, if feasible.

- Locate staging areas as close to construction sites as practicable to minimize driving distances between staging areas and construction sites.
- Encourage the use of the proper size of equipment for the job to maximize energy efficiency.
- Encourage the use of alternative fuels or power sources for generators at construction sites, such as propane or solar power, or use electrical power where practicable.

Table 10-4. Greenhouse gas impacts—Hancock County Marsh Living Shoreline.

EQUIPMENT DESCRIPTION	TOTAL HOURS USED	CO_2 FACTOR – MT*/100HRS	CO_2 (MT)	CH_4 FACTOR - MT/ 100HRS	CH_4 (MT)	NO_2 FACTOR- MT/ 100HRS	NO_2 (MT)	TOTAL CO_2 (MT)
Marine Mattress Fabrication								
Loader/bobcat (T-300 series)	11,880	2.65	314.82	0.90	106.92	10.60	1259.28	1681.02
100-ton crane (use at filling forms)	11,880	2.25	267.30	0.75	89.10	10.0	1188.00	1544.40
Flatbed truck	17,820	1.70	302.94	0.50	89.10	7.20	1283.04	1675.08
150-ton crane (offload and stockpile)	5,940	2.55	151.47	0.80	47.52	10.2	605.88	804.87
Marine Mattress Deployment								
Dredge Temporary Flotation Channel (60 ft. wide by 3 ft. deep)								
100-ton crane and clamshell	1,550	2.25	34.875	0.75	11.625	10.0	155	201.5
Tug (500 hp)	387.5	0.65	2.51875	0.20	0.775	2.60	10.075	13.37
Crewboat (single outboard motor)	310	0.065	0.2015	0.02	0.062	0.26	0.81	1.07
Waterside Equipment								
150-ton crane	5,940	2.55	151.47	0.80	47.52	10.20	605.88	804.87
Tug (500 hp)	5,795	0.65	37.6675	0.20	11.59	2.60	150.67	199.9275
Crewboat (single outboard motor)	1,159	0.065	0.75335	0.02	0.2318	0.26	3.0134	3.99855
Oyster Shell Deployment								
Small craft vessels (single outboard motor)	11,280	0.065	7.332	0.02	2.256	0.26	29.328	38.916
Reclamation of Shoreline								
Cutterhead Dredge Barge	840	0.65	5.46	0.20	1.68	2.60	21.84	28.98
84 days x 4500 cy/day								
46-acre Reef								
Crane and clamshell	1040	2.25	23.4	0.75	7.80	10	104	135.2
Tug	520	0.65	3.38	0.20	1.04	2.60	13.52	17.94
Crewboat	260	0.065	0.169	0.02	0.052	0.26	0.676	0.897
Total	**76,601.5**							**7,152.04**
*MT = metric tons; hp = horse power; cy= cubic yards								

Findings: Project construction would generate a total of 7,152 metric tons of carbon equivalents. Mitigation measures would further offset project impacts. The project would have short-term, minor impacts during construction.

10.3.6.6 Noise

Affected Resources

The Noise Control Act of 1972 (42 U.S.C. 4901 to 4918) was enacted to establish noise control standards and to regulate noise emissions from commercial products such as transportation and construction equipment. The standard measurement unit of noise is the decibel (dB), which represents the acoustical energy present. Noise levels are measured in A-weighted decibels (dBA), a logarithmic scale which approaches the sensitivity of the human ear across the frequency spectrum. A 3-dB increase is equivalent to doubling the sound pressure level, but is barely perceptible to the human ear. Table 10-5 presents some familiar sounds and their decibel levels.

Table 10-5. Familiar sounds and their decibel levels (DB).

SOUND	DECIBEL LEVEL (DB)
Whisper	30
Normal Conversation	50 – 65
Vacuum Cleaner at 10 ft.	70
Midtown Manhattan Traffic Noise	70 – 85
Lawnmower	85 – 90
Train	100
Nearby Jet Takeoff	130

Noise in the project area includes noise consistent with natural wetland and marine environments. Some minor noise from boats is also expected.

Environmental Consequences

Instances of increased noise are expected during the construction phases associated with the project. The proposed project would generate construction noise associated with equipment during construction of the breakwater, marsh, oyster cultch deployment, and temporary flotation channels. Fish, marine mammals, and nesting shorebirds could be exposed to construction noise. Construction noise would not impact human residences. The closest community is located two to three miles from the oyster cultch deployment and breakwater construction sites, respectively. However, construction noise may affect occasional boaters in the area. Potential adverse impacts to boaters and marine organisms during construction activities would be short term and minor. There would be no noise impacts after construction is completed except during maintenance of the breakwater after a few years and from vessel traffic during monitoring surveys. Appropriate BMPs would be employed to prevent, mitigate, and control potential impacts from noise to boaters, work crews, and marine organisms.

10.3.6.7 Biological Environment

The Mississippi Sound extends along the southern coasts of Mississippi and Alabama. The Mississippi Sound is separated from the Gulf of Mexico by several narrow barrier islands and sand bars (including Cat Island, Ship Island, Horn Island, and Petit Bois Island), which provide dynamic and diverse habitats especially for over 300 species of migratory or permanent resident bird species (USACE 2009). Along the Mississippi Sound, there are numerous coastal bays including St. Louis Bay, Biloxi Bay, Pascagoula Bay,

and Grand Bay. Coastal wetlands within the sound include swamps, tidal flats, brackish and salt-water marshes, and bayous. Expansive marsh systems include the Grand Bay marshes and the Pascagoula River marsh system to the east of the sound, and the Hancock County marshes in the west. These are rich in wildlife resources and provide nesting grounds and important stopovers for waterfowl and migratory birds, as well as spawning areas and valuable habitats for commercial and recreational fish.

The Mississippi Sound is shallow with water depths generally not exceeding 20 ft. Water is exchanged with the Gulf of Mexico through the openings between the barrier islands. Its partially protected nature and the influx of riverine freshwater create a salinity gradient within the Sound (Priddy et al. 1955). This delicate mix of fresh and salt water provides a suitable habitat for oysters, shrimp, and other fisheries. Christmas and Waller (1973) reported 138 fish species in 98 genera and 52 families taken from areas across Mississippi Sound. Vittor and Associates (1982) identified over 437 taxa of macrofauna from the sound with densities varying from approximately 1,200 to 38,900 individuals per square yard.

The biological environment section of this report includes a discussion of living coastal and marine resources including coastal and submerged aquatic vegetation, nearshore benthic invertebrates, protected species, essential fish habitat, and birds.

10.3.6.8 Living Coastal and Marine Resources

Coastal and Submerged Aquatic Vegetation (SAV)

Affected Resources

The plant communities of the project area are typical for palustrine, estuarine, and marine wetlands. Estuarine and palustrine habitats and submerged aquatic vegetation (SAV) are discussed in the affected resources section.

Estuarine and Palustrine Habitats

Estuarine emergent plants dominate the southernmost regions of the Pearl River marsh adjacent to the Mississippi Sound. Elevation and tidal inundation influence the zonation and distribution of these plants. The estuarine areas are composed of low-, mid-, and high-marsh zones. In the low-marsh areas, regularly flooded by tidal activity, the mesohaline habitat consists of smooth cordgrass (*Spartina alterniflora)*. The intermediate-marsh zone is irregularly flooded by tidal activity and is typically dominated by black needlerush (*Juncus roemerianus*), which can be intermixed with salt grass (*Distichlis spicata*) in oligohaline areas. In higher elevation areas, it is not uncommon to observe numerous species intermixed including salt grass, black needlerush, and salt meadow cordgrass (*Spartina patens*).

Palustrine habitats in the project area consist of a dominant overstory of live oak (*Quercus virginiana)* with some slash pine (*Pinus elliottii)*. A variety of understory species are found with wax myrtle (*Myrica cerifera)* and yaupon holly (*Ilex vomitoria)* as the dominant species. Often, the salt-tolerant shrubs marsh elder (*Iva frutescens)* and saltbush (*Baccharis halimifolia)* border these areas. Saw palmetto (S*erenoa repens*) is also found at higher elevations outside of the tidal boundary.

SAVs

The marine environment in the project area is a shallow system increasing in depth to over 12 ft. toward St. Joseph's Pass, which is periodically used as a passage channel by large vessels. In the summer of

2013, a survey of SAV and oyster presence in Heron Bay, revealed scarce amounts of Widgeon grass (*Ruppia maritima)* in very shallow water along eroded marsh edge platform.

Environmental Consequences

Estuarine and Palustrine Habitats

During marsh creation there would be short-term, minor, adverse impacts to the flora within the estuarine or palustrine habitats due to sediment placement at the shoreline edge. Natural vegetative colonization of these areas would occur within one to three years and would be expected to mitigate erosion from wind and wave activity in the long term. The project would provide a long-term benefit to flora by protecting habitat from shoreline erosion and by reestablishing marsh habitat in created wetland areas.

SAVs

None of the construction areas associated with the breakwater or marsh creation development contains SAVs. Therefore, these construction activities would have no impact on submerged vegetation. Construction of the breakwater could provide areas conducive to SAV growth.

The deployment of the oyster cultch could result in short-term, minor, adverse impacts to SAV. Widgeon grass exists in scarce amounts in very shallow waters along the fringe of the marsh edge in Heron Bay and grows on eroded marsh platforms. Any disturbance would be re-vegetated naturally.

Therefore, due to the lack of existing seagrass beds or minimal coverage of seagrass in the project area, only very minimal adverse impacts from the proposed activities would be expected.

Invasive Species

Affected Resources

The potential introduction of terrestrial and aquatic non-native invasive species of plants, animals, and microbes is a concern for any proposed project. Non-native invasive species could alter existing terrestrial or aquatic ecosystems, may cause economic damages and losses, and are frequently the second most common reason for protecting species under the Endangered Species Act. The species that are or may become introduced, established, and invasive are difficult to identify. The analysis focuses on pathway control or actions/mechanisms that may be taken or implemented to prevent the spread of invasive species on site or introduction of species to the site. Surveys have not been conducted to determine if invasive species are present.

Environmental Consequences

This project involves placement of breakwater, oyster cultch, marsh creation, and dredging of flotation channels. The marsh creations involve dredging sediments from a nearby marine environment and placing them in shallow waters to create marsh. A variety of in-water construction equipment will be used. Each of these actions and pieces of equipment serve as a potential pathway to introduce or spread invasive species. To ensure these pathways are “broken” and do not spread or introduce species the following BMPs will be implemented: all equipment to be used during the project, including personal gear, will be inspected and cleaned such that there is no observable presence of mud, seeds, vegetation, insects and other species. Sediments for marsh creation will come from the MDMR Beneficial Use of Sediment Program or nearby sources. Since the sediments are regional they are

expected to support the fauna in aquatic habitats at the project. Sediments used in marsh creation could contain invasive/opportunistic species. Oyster cultch and vegetation will be treated or inspected to remove "non-target" species.

BMPs to prevent the spread of invasive species through common pathways will be implemented thereby minimizing the potential for short and long-term adverse impacts from the proposed project. The implementation of these BMPs meets the spirit and intent of EO 13112. Due to the implementation of BMPs, the Trustees expect risk from invasive species introduction and spread to be short term and minor.

Nearshore Benthic Invertebrates

Affected Resources

Oysters

Oysters are important as both organisms and habitat with an integral role in the functioning of the ecosystem. The aggregations of oysters that comprise an oyster reef result in a complex and hard substrate that provides habitat for multiple benthic organisms and fish, increasing biodiversity in estuaries. Within an oyster reef community, oysters are the dominant species, though more than 300 other macrofauna species may be living on an oyster reef. Oysters are an ecological keystone species in most estuaries along the Atlantic and Gulf coasts, and oyster populations contribute to the integrity and functionality of estuarine ecosystems.

Oyster reefs of commercial importance are subtidal and form aggregates that cover thousands of acres of the Mississippi Sound. Mississippi's 17 oyster reefs, which cover 12,000 acres, are managed by the MDMR. Approximately 97 percent of the commercially harvested oysters in Mississippi come from reefs in the western part of the Mississippi Sound, primarily from Pass Marianne, Telegraph, and Pass Christian reefs.

Benthic Infauna and Epifauna

Benthic infauna are aquatic animals that live in the substrate of the sea bottom, whereas epifauna live on the surface of the sea floor. Nearshore benthic communities in the Gulf are largely composed of macroinvertebrate groups such as mollusks, sponges, polychaetes, corals, and crustaceans. These groups are diverse and are found in Gulf habitats spanning from the intertidal zone to the soft sediments on the continental shelf. Benthic communities perform important ecological functions in the nearshore food web; several groups (e.g., lobster, shrimp, and crabs) are also commercially important. This section presents a description of the key benthic resources of the Gulf, their ecological importance, and their distribution among Gulf habitats.

Sponges, mollusks, arthropods (including crustacea), and polychaetes are all important taxa and contribute substantially to benthic biomass. These taxa include many filter-feeding species, which remove and digest phytoplankton and particulate organic matter and deposit processed materials to the substrate (Felder and Camp 2009). Benthic fauna are often habitat forming and provide habitat and nursery areas for fish and crevices for mobile invertebrates to seek shelter; they also harbor diverse microbial communities (Taylor et al. 2007). Mollusks and crustaceans, including both shrimp and crab, are important ecologically and commercially throughout the Gulf region.

Environmental Consequences

Construction of the breakwater, marsh, and oyster cultch deployment would result in an alteration of 65.9 acres of benthic soft-bottom habitat and would enhance 46 acres of remnant oyster reef. In addition, approximately 101 acres of soft-bottom habitat would have minor, short-term, adverse impacts due to the excavation of temporary flotation channels.

Oysters, Infauna and Epifauna

Heron Bay was recently surveyed (summer 2013) for the presence of oysters. Remnant hard-bottom habitat was identified, but there were no existing oyster reefs in the area. In addition, the project area is a highly eroded shoreline with limited hard-bottom habitat. Cultch deployment would result in short-term minor adverse impact to remnant hard-surface bottom habitat that was historically oyster reefs in the project area. Approximately 46 acres of cultch placement would result in oyster colonization over a two-to-five-year period. Development of an oyster reef represents a long-term benefit to oysters and the infauna and epifauna that typically colonize subtidal oyster reefs.

Mollusks and crustaceans such as shrimp and crab are likely limited in soft-sediment areas where construction would occur. These mobile invertebrates would experience a short-term minor impact and would be positively impacted by the placement of hardened structure. The project would result in 19.9 acres of three-dimensional high-relief breakwater that would be colonized by oysters, infauna, and other epifauna. In addition, 46 acres of oyster reef and 46 acres of created marsh would serve as habitat for these species. The zone between the breakwater and the existing eroded shoreline would also become a more stable soft-bottom habitat for these species. This represents a substantial long-term benefit for these organisms.

Temporary flotation channel construction would temporarily displace sediment-dwelling invertebrates in 101 acres. The impact would be short term and minor. Channels would fill in and are anticipated to be recolonized by existing organisms in nearby sediments.

Effort would be made during construction and during placement of materials to avoid existing environmentally sensitive areas such as viable productive oyster reefs, emergent and SAV, and other live-bottom communities.

Findings: There would be a short-term minor impact to infauna, epifauna, and hard-bottom oyster habitat. The construction of the Hancock County Marsh Living Shoreline would result in a substantial increase in habitat and, consequently, colonization by invertebrates, essentially providing a long-term benefit to oysters, benthic infauna, and epifauna secondary productivity in the Hancock County marsh area. There would be a long-term impact to benthic communities in the 65.9 acres of soft-bottom habitat converted to hard substrate for breakwater and marsh creation. However, soft-sediment areas are prolific in the proposed project area and the proposed reef footprint would not result in a substantive change in available habitat in the region. Therefore, impacts to the benthic community would be minor.

Marine Mammals

Affected Resources

Marine mammals found within the Gulf of Mexico include 21 species of cetaceans (whales and dolphins) and the West Indian manatee. The Marine Mammal Protection Act (MMPA) prohibits the

"taking" of marine mammals incidental to a specified activity, unless such taking is appropriately authorized.

Dolphin Species

The bottlenose dolphin, *Tursiops truncatus*, and the Atlantic spotted dolphin, *Stenella frontalis*, are the two most common marine mammals found in the Gulf of Mexico. Both species feed primarily on fish, squid and crustaceans. While *S. frontalis* spends the majority of its life offshore, *T. truncatus* often travel into coastal bays and inlets for feeding and reproduction.

West Indian Manatee

The West Indian manatee (*Trichechus manatus latirostris*) is listed as endangered under the ESA. The species is endangered due to its small population size (less than 2,500 mature individuals with possible population decline), the possibility of at least a 50 percent future reduction in population size, and near- and long-term threats from human-related activities (FWS 2010; FWC 2007). Between October and April, manatees concentrate in areas of warmer water. During summer months, the species may migrate as far west as the Louisiana and Texas coast on the Gulf of Mexico. Manatees inhabit both salt and fresh water of sufficient depth (about 5 feet to usually less than 18 feet). Manatees will consume any aquatic vegetation available to them including sometimes grazing on the shoreline vegetation.

Marine Mammal Environmental Consequences

Noise and other activity associated with proposed construction may temporarily disturb certain dolphin species and manatee in the vicinity of the project area through temporary impacts on prey abundance, water quality (turbidity), and underwater noise, and may temporarily increase the potential for boat collisions with certain species in the project area. However, the mobility of these species reduces the risk of injury due to construction activity. Based on the mobility of these species, the short duration of construction activities, and the proposed construction methodology, effects on dolphin species are not anticipated.

Extreme care should be taken during construction not to disturb or injure manatees. If manatee(s) are found to be present in the immediate project area during restoration activities, construction would be halted until the species moves away from the project area.

The Trustees evaluated the potential for incidental take of marine mammals. The proposed project is located in shallow estuarine waters and will not involve construction methodologies known to impact marine mammals. In addition, the following conservation measures will be implemented to avoid impacts to marine mammals that could be in the area: Standard Manatee Conditions (A-D) for In-Water work (USFWS, 2011); Smalltooth Sawfish and Sea Turtle construction guidelines (NMFS, 2006); Measures for Reducing Entrapment Risk to Protected Species (NMFS, 2006). The Trustees do not anticipate any take, incidental or otherwise, under the MMPA due to the implementation of the project.

10.3.6.9 Protected Species

Affected Resources

The U.S. Fish and Wildlife Service (USFWS) lists species as threatened or endangered when they meet criteria detailed under the Endangered Species Act (ESA) of 1973, as amended (16 U.S.C. §1531 et seq.). Additionally, Mississippi Wildlife Fisheries and Parks (MWFP) and NOAA National Marine Fisheries Service (NMFS) identify and list protected species. Section 7(a)(2) of the ESA requires that each federal

agency ensure that any action authorized, funded, or carried out by the agency is not likely to jeopardize the continued existence of any endangered or threatened species or result in the destruction or adverse modification of critical habitat of those species. When the action of a federal agency may affect a protected species or its critical habitat, that agency is required to consult with either the NMFS or the USFWS, depending upon the protected species that may be affected. Endangered Species Act Section 7 consultations were conducted and the appropriate recommendations would be incorporated into the proposed project. Migratory Bird Treaty Act compliance and Bald and Golden Eagle Protection Act compliance are discussed in this section.

Federally protected species that are known to occur or could occur in Hancock County are listed in Table 10-6. However, only the piping plover, red knot, five sea turtle species, Gulf sturgeon, and West Indian manatee are likely to occur in or near the project area or could pass through the project area.

Table 10-6. Hancock County Marsh Living Shoreline—threatened, endangered, and proposed species in Hancock County, Mississippi.

COMMON NAME	SCIENTIFIC NAME	FEDERAL STATUS	STATE STATUS	HABITAT
Birds				
Piping Plover	*Charadrius melodus*	Threatened	Endangered	Beaches and mudflats in southeastern coastal areas
Red Knot	*Calidris canutus rufa*	Proposed	--	Marine intertidal habitats including inlets, estuaries, and bays feeding in mud and sand flats on beaches and barrier islands
Ferns and Allies				
Louisiana Quillwort	*Isoetes louisianensis*	Endangered	--	Aquatic or wet habitats, mostly shallow streams in bottomland habitats (MDWFP 2001; HCBS 2012)
Mollusks				
Inflated Heelsplitter	*Potamilus inflatus*	Threatened	Endangered	Riverine, Lower Pearl River, Noxubee, and Tombigbee watersheds in areas with moderate to swift currents, riffle/shoals areas with stable bottoms of sandy gravel or firm mud, gravel, and cobble
Fishes				
Gulf Sturgeon	*Acipenser oxyrinchus desotoi*	Threatened	Endangered	Migrates from large freshwater coastal rivers to brackish and marine coastal bays and estuaries
Mammals				
West Indian Manatee	*Trichechus manatus*	Endangered	Endangered	Fresh and salt water in large coastal rivers, bays, bayous and estuaries
Louisiana Black Bear	*Ursus americanus luteolus*	Threatened	Endangered	Bottomland hardwood forest; dispersal corridors
Reptiles				
Hawksbill Sea Turtle	*Eretmochelys imbricate*	Endangered	Endangered	Coral reefs, open ocean, bays, estuaries
Leatherback Sea Turtle	*Dermochelys coriacea*	Endangered	Endangered	Open ocean, coastal waters
Kemp's Ridley Sea Turtle	*Lepidochelys kempii*	Endangered	Endangered	Nearshore and inshore coastal waters, often in salt marshes; neritic zones with muddy or sandy substrate (NOAA Fisheries 2013b)
Green Sea Turtle	*Chelonia mydas*	Threatened	Endangered	Shallow coastal waters with SAV and algae, nests on open beaches
Loggerhead Sea Turtle	*Caretta caretta*	Threatened	Endangered	Open ocean; also inshore areas, bays,

COMMON NAME	SCIENTIFIC NAME	FEDERAL STATUS	STATE STATUS	HABITAT
				salt marshes, ship channels and mouths of large rivers
Ringed Map Turtle	*Graptemys oculifera*	Threatened	Endangered	Riverine, river stretches with moderate currents, abundant basking sites, and sand bars for nesting (MDWFP 2001; USFWS 2010)
Gopher Tortoise	*Gopherus Polyphemus*	Threatened	Endangered	Open canopy longleaf pine/scrub oak habitats with well-drained sandy soils and ground cover (USFWS 2010; HCBS 2012)

Birds

Piping Plover (*Charadrius melodus*): The piping plover does not nest in Mississippi; however, this species uses Gulf Coast beaches and barrier islands for wintering (MDWFP 2001). Plovers use sparsely vegetated sand beaches, mudflats, and salt marshes for roosting and foraging. Piping plover critical habitat occurs in the vicinity of the project area but does not occur within the project footprint.

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

Fishes

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

Gulf Sturgeon Designated Critical Habitat

The entire project footprint area falls within Gulf sturgeon critical habitat (Unit 8-Lake Ponchartrain-Mississippi Sound). Critical habitat was designated in 2003 by the National Marine Fisheries Service (NMFS) and was based on seven primary constituent elements (PCEs) essential for its conservation. The

proposed project area contains four PCEs. The PCEs include abundance of prey items, water quality, sediment quality, and safe and unobstructed migratory pathways. In addition, the Trustee is working with NMFS to ensure that the project would not adversely affect any of the PCEs identified.

Mammals

West Indian Manatee (*Trichechus manatus*): This species uses both fresh and saltwater habitats such as coastal rivers, bays, bayous, and estuaries. The manatee is an occasional visitor to Mississippi's coasts, although migration into the area is poorly understood. After wintering in Florida, and perhaps Mexico, manatees migrate northward during spring, including to Mississippi and Alabama waters, although these migrations are not well understood (Fertl et al. 2005). Manatees frequently seek out freshwater sources such as rivers and river mouths and have been known to be found near estuaries (Fertl et al. 2005). Seagrasses are the typical manatee forage material; however, manatees can also consume other aquatic vegetation, algae, and terrestrial vegetation (Fertl et al. 2005). Given the lack of their main food source at the site, any manatee occurrence is expected to be transitory.

Reptiles

Hawksbill Sea Turtle (*Eretmochelys imbricata*): Although this species uses various habitats such as the open ocean, bays, and estuaries throughout different life stages, it is mainly associated with coral reefs. This species nests in Florida from April to November (NOAA Fisheries 2013a). It likely does not nest in Mississippi and observations are rare in the state (MDWFP 2001; NOAA Fisheries 2013a). The main dietary items of this species are sponges and other invertebrates (NOAA Fisheries 2013a).

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

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

Green Sea Turtle (*Chelonia mydas*): This species typically prefers shallow coastal waters with SAV and algae for foraging and nests on open beaches (NOAA Fisheries 2012). Nesting typically does not occur on mainland beaches and there is likely no Mississippi nesting at all (MDWFP 2001; NOAA Fisheries 2012). This species migrates long distances in the open ocean from nesting to feeding areas. Observations of this species in Mississippi are rare (MDWFP 2001).

Loggerhead Sea Turtle (*Caretta caretta*): Loggerhead habitat for foraging and migration includes open ocean, inshore areas, bays, salt marshes, ship channels, and mouths of large rivers. This sea turtle feeds

on mollusks, fish, crustaceans, and other marine organisms. This species typically nests at night from late April through September (NOAA Fisheries 2013c). Although loggerheads occasionally use barrier islands for nesting, mainland nesting is rare (MDWFP 2001). Preferences for nesting beaches include high-energy coarse-grained beaches adjacent to the ocean that are narrow and steeply sloped (NOAA Fisheries 2013c). This species has been observed in nearshore waters of the Mississippi Sound during migration and foraging and has been accidentally caught by shore-based fishermen (MDWFP 2001).

Environmental Consequences

Potential impacts to threatened or endangered species and their critical habitat are presented in Table 10-7. The piping plover, red knot, five sea turtle species, Gulf sturgeon, and West Indian manatee are likely to occur in or near the project area or could pass through the project area and are discussed below.

Table 10-7. Threatened and endangered species impacts.

SPECIES /CRITICAL HABITAT	POTENTIAL IMPACTS TO SPECIES/CRITICAL HABITAT
Green sea turtle *(Chelonia mydas)*	While not likely to be impacted or to impede transitory routes, sea turtles are a mobile marine species and project activities would not impede transitory routes. There is no nesting habitat in the project area. There is no designated or proposed critical habitat for sea turtles within the action area. If individuals enter construction areas, construction would be halted and could result in short-term, minor impacts.
Hawksbill sea turtle *(Eretmochelys imbricata)*	
Kemp's Ridley sea turtle *(Lepidochelys kempii)*	
Leatherback sea turtle *(Dermochelys coriacea)*	
Loggerhead sea turtle *(Caretta caretta)*	
Piping plover *(Charadrius melodus)*	None expected. Piping plover are not known to occur in the footprint of construction and critical habitat is also outside of the construction footprint.
West Indian manatee *(Trichechus manatus)*	West Indian manatees are not likely to occur in the project area. Short-term minor impacts could occur if manatees come into contact with construction activities. Manatees are a mobile marine species and project activities would not impede transitory routes. If individuals enter construction areas, construction would be halted and could result in short-term, minor impacts.
Gulf sturgeon *(Acipenser oxyrhynchus desotoi)* (Designated Critical Habitat)	The project is in designated critical habitat. To the extent practicable, project construction would be limited to the window between May and October, after sturgeon have migrated to their riverine habitat. If work continues beyond the May to October window, continued adherence to the Sea turtle and Smalltooth Sawfish Construction Conditions (NMFS, 2006) will minimize the potential for impacting Gulf Sturgeon . No direct or indirect impacts from construction are expected in the riverine ecosystems. If individuals enter construction areas, short-term, minor impacts could be the result. PCEs for Gulf Sturgeon will not be adversely modified by the proposed project.

West Indian Manatee

Although impacts to West Indian manatee are not expected, short-term, minor impacts could occur if an individual comes into contact with construction activities. If manatee(s) are found to be present in the immediate project area during restoration activities, construction would be halted until the species moves away from the project area. Standard Manatee Conditions (A-D) for In-Water Work (USFWS,

2011) which are applicable to the Hancock County Marsh Living Shoreline project will be followed and include:

All personnel associated with the project shall be instructed about the presence of manatees and manatee speed zones, and the need to avoid collisions with and injury to manatees. The permittee shall advise all construction personnel that there are civil and criminal penalties for harming, harassing, or killing manatees, which are protected under the Marine Mammal Protection Act and the Endangered Species Act.

All vessels associated with the construction project shall operate at "Idle Speed/No Wake" at all times while in the immediate area and while in water where the draft of the vessel provides less than a four-foot clearance from the bottom. All vessels will follow routes of deep water whenever possible.

All on-site project personnel are responsible for observing water related activities for the presence of manatees. All in water operations, including vessels, must be shutdown if a manatee(s) comes within 50 feet of the operation. Activities will not resume until the manatee(s) has moved beyond the 50 feet radius of the project operation, or until 30 minutes elapses if the manatee(s) has not reappeared within 50 feet of the operation. Animals must not be herded away or harassed into leaving.

If necessary, temporary signs concerning manatees shall be posted prior to and during all in-water project activities. All signs are to be removed by the permittee upon completion of the project. Temporary signs that have already been approved for this use. Temporary signs, if necessary, can be modified from the standard template to reflect local conditions.

Sea Turtles

The green sea turtle, hawksbill sea turtle, Kemp's Ridley sea turtle, leatherback sea turtle, and loggerhead sea turtle do not have more than a transient occurrence, if any, within the project area. The sea turtles do not nest in the area although, depending on the species, individuals have been rarely to sporadically observed in coastal Mississippi waters. The sea turtle species are highly mobile. The project components would be constructed very close to the shoreline and are therefore not expected to impede sea turtle migratory routes. In summary, impacts to these species, if any, would be short term and minor (Table 10-7). If any sea turtles are found to be present in the immediate project area during restoration activities, construction would be halted until species moves away from project area. Precautionary measures would include construction personnel education, proper use and selection of siltation barriers, use of "no wake/idle" speeds in proper locations, adherence to protection guidelines when a sea turtle is within 100 yards of activities, and reporting of turtle injuries.

Gulf Sturgeon and Designated Critical Habitat

The project area is in Gulf sturgeon critical habitat. The comparatively narrow project footprint would preserve sufficient area for the movement of Gulf sturgeon. The project sponsors intend to manage construction activities to avoid seasonal migration pathways in and out of the adjacent Pearl River mouth. To minimize potential for impacts to this species, all construction would take place in the May-to-October time frame when the sturgeons have migrated to riverine habitats. The benthic habitat that is present in the project area is not the preferred Gulf sturgeon foraging habitat. Gulf sturgeons prefer well-oxygenated, clear water with sandy substrates for feeding, whereas the project area mainly consists of soft, silty substrates and turbid waters. Also, sturgeons typically forage in waters 6 ft. or

deeper—not in the shallow 1- to 6-ft. depths of the proposed project elements. Implementation of the project is expected to benefit the species by enhancing water quality through oyster productivity. Any adverse impacts to Gulf sturgeons or their critical habitat would be short term and minor. There would be no long-term impacts to Gulf sturgeons or their critical habitat. Prior to breakwater construction, the contractor will be made aware of the potential presence of sturgeon. If any are observed during construction, work will cease until the sturgeon have moved away from the construction area. The project is not likely to adversely affect individual Gulf sturgeon. In the unlikely event that Gulf sturgeon occur in the construction area, there could be limited temporary and minor adverse effects to individual sturgeon due to increased noise from construction activities. Because of the shallow construction area and the timing of construction, species occurrence during construction is not anticipated.

Findings: ESA Section 7 consultations were completed with USFWS on January 24, 2014 (McClain 2014) and with NMFS (Crabtree 2014) on April 11, 2014 with pending amendments on specific conservation measures and BMPs. The USFWS concurred that the project is not likely to adversely affect West Indian Manatee and no effects are expected to other listed, proposed, or candidate species considered in the consultation. Because no adverse effects to manatee under ESA are expected, the Trustees determined that no take of manatee under MMPA will occur.

NMFS concurred that the project, as proposed, is not likely to adversely affect any threatened endangered species or critical habitats, including the Gulf sturgeon. Upon completion of that coordination, Mississippi intends to implement conservation measures that are required by the USFWS and NMFS. Those measures include:

- Awareness of potential turtle presence. If any sea turtles are found to be present in the immediate project area during restoration activities, construction will be halted until species moves away from project area.
- Awareness of manatee presence. If manatee(s) are found to be present in the immediate project area during restoration activities, construction will be halted until species moves away from project area. For in-water work in Mississippi where manatees could be present, the Trustee will follow conditions a, b, c, and d of the Standard Manatee Conditions for In-water Work (USFWS, 2011). The Trustee would report any collisions to the U.S. Fish and Wildlife Service or State trust resource agency. Temporary signs, if necessary, would be modified from the standard template to reflect local conditions.
- Measures to protect Gulf Sturgeon. Project restoration features will be built close to the shoreline in shallow water (1-4 feet) and will not impede any migratory paths. To the extent practicable, project components will be constructed in the months of May through October to avoid inter-riverine migration movements. Project construction activities will be subject to a stop work order if the species is observed in the project footprint. Work will continue once the species leaves the area.
- If construction activities continue beyond the May to October window, there would be continued adherence to the Sea Turtle and Smalltooth Sawfish Construction Conditions, dated March 23, 2006 (NMFS, 2006).
- The project will follow Measures for Reducing Entrapment Risk to Protected Species, revised May 22, 2012 (NMFS, 2006).

Migratory Birds

Affected Resources

Migratory bird guilds that could have presence in the Hancock County Marsh Living Shoreline project area include wading birds, seabirds, waterfowl, raptors, rails and coots, landbirds, and doves and pigeons (see Table 10-8).

Bald and Golden Eagle Protection Act

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

Table 10-8. Migratory birds anticipated in the Hancock County Marsh Living Shoreline project area.

SPECIES	BEHAVIOR	SPECIES/HABITAT IMPACTS
Wading birds (herons, egrets, ibises)	Foraging, feeding, resting, roosting, nesting	Wading birds primarily forage and feed at the water's edge. As such, they may be impacted locally and temporarily by the project. It is expected that they would be able to move to another nearby location to continue foraging, feeding and resting. These birds primarily nest and roost in trees or shrubs (e.g., pines, *Baccharis*), which occur outside the project area.
Shorebirds (plovers, oystercatchers, stilts, sandpipers)	Foraging, feeding, resting, roosting, nesting	Shorebirds forage, feed, rest, and roost in the project area. As such, they may be impacted locally and temporarily by the project. It is expected that they would be able to move to another nearby location to continue foraging, feeding and resting. The project would be constructed in areas where shorelines are substantially eroded. In the project area, there is limited natural beach and mudflat where shorebirds would nest.
Seabirds (terns, gulls, skimmers, double-crested cormorant, American white pelican, brown pelican)	Foraging, feeding, resting, roosting, nesting	Seabirds forage, feed, rest, and roost in the project area. As such, they may be impacted locally and temporarily by the project. It is expected that they would be able to move to another nearby location to continue foraging, feeding and resting. Nesting habitat does not exist in the project area; therefore, it is not anticipated to impact nesting.
Waterfowl (ducks, loons, and grebes)	Foraging, feeding, resting, roosting, nesting	Waterfowl forage, feed, rest, and roost in the project area. As such, they may be impacted locally and temporarily by the project. It is expected that they would be able to move to another nearby location to continue foraging, feeding and resting. These birds primarily roost and nest in low vegetation, which is not directly inside the project area; therefore, it is not anticipated to impact nesting.
Raptors (osprey, hawks, eagles, owls)	Foraging, feeding, resting, roosting, nesting	Raptors forage, feed, and rest in the project area. As such, they may be impacted locally and temporarily by the project. It is expected that they would be able to move to another nearby location to continue foraging, feeding and resting. Most raptors are aerial foragers and soar long distances in search of food. Locations where these birds roost and nest are not within the project area.

SPECIES	BEHAVIOR	SPECIES/HABITAT IMPACTS
Rails and coots	Foraging, feeding, resting, roosting, nesting	Rails and coots forage, feed, rest, or roost in the project area. As such, they may be impacted locally and temporarily by the project. However, they are most likely to favor marshy areas. It is expected that they would be able to move to another nearby location to continue foraging, feeding and resting if disturbed by the project. These birds primarily roost and nest in marshes, which are not directly within the project area; therefore, it is not anticipated to impact nesting.

Environmental Consequences

Migratory Bird Treaty Act

The Trustee has reviewed the project site and determined that migratory bird nesting is not known and is possible. The MBTA requires the protection of all migratory bird species and protection of ecosystems of special importance to migratory birds against detrimental alteration, pollution, and other environmental degradation. Coordination under MBTA with the USFWS was completed on January 24, 2014. Pre-construction nesting surveys for migratory birds and raptors would be conducted and if evidence of nesting is found, coordination with the USFWS would be initiated to develop and implement appropriate conservation measures. Due to the implementation of best management practices no "take" is anticipated.

Bald and Golden Eagle Protection Act

There are no golden eagles in the project area. No bald or golden eagles are known to nest within 660 ft. of the project area. Thus, no impacts to golden or bald eagles are anticipated. Coordination under BGEPA by the USFWS was completed on January 24, 2014. Because no nests are nearby, no "take" is anticipated.

Findings: Adverse impacts, if any, to birds as a result of construction are expected to be short term and minor. These impacts, if any, could include noise and vibration of construction equipment. The general behavior of the birds is to mediate their behavior to avoid these areas. In addition, over the long term the creation of the breakwaters could result in increased food availability in and around the structures, created marsh, and oyster beds. Created wetlands would not be replanted but would be allowed to re-vegetate naturally. The open sediment would provide a short-term benefit for shorebird utilization.

10.3.6.10 Essential Fish Habitat

Affected Resources

The 1996 Magnuson-Stevens Fishery and Conservation Act requires cooperation among NOAA Fisheries, anglers, and federal and state agencies to protect, conserve, and enhance Essential Fish Habitat (EFH). EFH is defined as those waters and substrates necessary to fish for spawning, breeding, feeding, or growth to maturity. The designation and conservation of EFH seek to minimize adverse effects on habitat caused by fishing and non-fishing activities. NOAA's Estuarine Living Marine Resources Program developed a database on the distribution, relative abundance, and life history characteristics of ecologically and economically important fishes and invertebrates in the nation's estuaries. NOAA has designated EFH for more than 30 estuaries in the northern Gulf of Mexico for a number of species of finfish and shellfish.

EFH consists of the following waters and substrate areas in the Gulf of Mexico (GMFMC 2004 and 2005,) and the project area:

Red Drum (*Sciaenops ocellatus*) Fishery Management Plan (FMP): All estuaries; Vermilion Bay, Louisiana, to the eastern edge of Mobile Bay, Alabama, out to depths of 150 ft.; Crystal River, Florida, to Naples, Florida, between depths of 30 and 60 ft.; and Cape Sable, Florida, to the boundary between the areas covered by the Gulf of Mexico Fishery Management Council (GMFMC) and the South Atlantic Fishery Management Council (SAFMC) between depths of 30 and 60 ft.

In the project area, the red drum fishery is very common. The estuarine zone is used by this species in all life stages. Habitat use is highest for nearshore hard bottoms, nearshore sand/shell, estuarine SAV, and estuarine soft bottoms (GMFMC 2005). Larvae, juveniles, and young adults spend the majority of their time in estuarine habitats and prey on a large array of species including blue crab eggs and numerous juvenile fish (Table 10-9).

Reef Fish and Coastal Migratory Pelagics FMPs: All estuaries; the U.S./Mexico border to the boundary between the areas covered by the GMFMC and the SAFMC from estuarine waters out to depths of 600 ft.

In the project area, the reef fish fishery includes numerous species that utilize the estuarine zone in certain life stages. Most are transitory species that use inshore environments part of the year. Only mutton (*Lutjanus analis*) and gray snapper (*Lutjanus griseus*) use the estuarine zone as adults for feeding. Reef species have the potential to use this zone as early or late juveniles for growth and feeding habitat. Of the three coastal migratory pelagic species listed for the project area, only the Spanish mackerel (*Scomberomorus maculatus*) uses the estuarine zone during the early and late juvenile and adult life stages (Table 10-9).

Shrimp FMP: All estuaries; the U.S./Mexico border to Fort Walton Beach, Florida, from estuarine waters out to depths of 600 ft.; Grand Isle, Louisiana, to Pensacola Bay, Florida, between depths of 600 and 2,000 ft.; Pensacola Bay, Florida, to the boundary between the areas covered by the GMFMC and the SAFMC out to depths of 200 ft., with the exception of waters extending from Crystal River, Florida, to Naples, Florida, between depths of 60 and 150 ft. and in Florida Bay between depths of 30 and 60 ft. (Table 10-9).

Table 10-9. Essential fish habitat considerations for Hancock County Marsh Living Shoreline Project.

GOM FMP GROUP	SPECIES	HABITAT TYPE	EGGS	LARVAE	POST LARVAE	EARLY JUVENILES	LATE JUVENILES	ADULTS	SPAWNING ADULTS
Red Drum Fishery	Red Drum (*Scianops ocellatus*)	SAV, soft bottom, sand/shell, emergent marsh		growth; feeding	growth; feeding	growth; feeding	growth; feeding	Feeding	feeding
Reef Fish Fishery	Mutton Snapper *(Lutjanus analis)*	SAV				growth; feeding	growth; feeding	Feeding	
	Cubera Snapper *(Lutjanues cyanopterus)*	SAV, emergent marsh				Growth	growth		
	Gray Snapper *(Lutjanus griseus)*	SAV, soft bottom, sand/shell,			growth; feeding	growth; feeding	growth; feeding	Feeding	

GOM FMP GROUP	SPECIES	HABITAT TYPE	EGGS	LARVAE	POST LARVAE	EARLY JUVENILES	LATE JUVENILES	ADULTS	SPAWNING ADULTS
		emergent marsh							
	Lane Snapper *(Lutjanus synagris)*	SAV, soft bottom, sand/shell			growth	growth; feeding	growth; feeding		
	Yellowtail Snapper *(Occurs chrysurus)*	SAV, soft bottom				growth; feeding			
	Goliath Grouper *(Epinephelus itajara)*	SAV, hard bottom				growth; feeding	growth; feeding		
	Red Grouper *(Epinephelus morio)*	SAV, hard bottom				growth; feeding	growth; feeding		
	Black Grouper *(Mycteroperca bonaci)*	SAV				growth; feeding			
Coastal Pelagic Fishery	Spanish Mackerel *(Scomberomorus maculatus)*	pelagic				growth; feeding	growth; feeding	growth; feeding	
Shrimp Fishery	Brown Shrimp *(Farfantepenaeus aztecus)*	SAV, soft bottom, sand/shell, emergent marsh, oyster reef			growth; feeding	growth; feeding	growth; feeding		
	White Shrimp *(Litopenaeus setiferus)*	emergent marsh, soft bottom			growth; feeding	growth; feeding	growth; feeding		
Highly Migratory Species	Scalloped Hammerhead Shark (*Sphyma lewini*), Bonnethead Shark (*Sphyma tiburo*), Blacktip Shark (*Carcharhinus limbatus*), Bull Shark (*Carcharhinus leucas*), Spinner Shark (*Carcharhinus brevipinna*), and Atlantic Sharpnose Shark (*Rhizoprionodon terraenovaee*)	SAV, emergent marsh, soft bottom, sand/shell,				growth; feeding	growth; feeding	growth; feeding	

Shrimp fishery species that use the estuarine zone near the project area include two penaeid types: brown and white shrimp (*Farfantepenaeus aztecus* and *Litopenaeus setiferus*). Post-larvae, early juvenile, and late-juvenile shrimp of both species use estuarine habitat for survival. Emergent marsh and marsh edge are particularly important microhabitats for these species, and they would use the tidal

cycle to enter low emergent marsh adjacent to the shoreline (GMFMC 2004). Additionally, brown shrimp are common in oyster reef and SAV habitats.

Highly Migratory Species FMP: EFH for highly migratory species consists of Gulf of Mexico waters and substrates extending from the U.S./Mexico border to the boundary between the areas covered by the Gulf of Mexico Fishery Management Council and the South Atlantic Fishery Management Council from estuarine waters out to depths of 100 fathoms.

These areas are connected by currents and water patterns that influence the occurrence of highly migratory species (HMS) at particular times of the year. Due to habitat-specific requirements of each species, EFH for each HMS potentially occurring in the vicinity of the Hancock County Marsh Living Shoreline is described below (EFH information from NMFS 2009). The HMS species include scalloped hammerhead shark (*Sphyma lewini*), bonnethead shark (*Sphyma tiburo*), blacktip shark (*Carcharhinus limbatus*), bull shark (*Carcharhinus leucas*), spinner shark (*Carcharhinus brevipinna*), and Atlantic sharpnose shark (*Rhizoprionodon terraenovaee*).

Environmental Consequences

Project impacts and benefits to fisheries are discussed below.

Red Drum

Red drum could be impacted initially by construction activities when living shoreline material, oyster cultch, and dredged sediment for marsh creation are deposited in the benthic zone. There would likely be impacts to benthic invertebrate populations, small ichthyofauna (the indigenous fish of a region), and adult fish. The adverse impacts are expected to be minor and short term in duration, with a transition to intermediate and long-term benefit to the species as a result of habitat creation, preservation, and increased biological productivity.

Reef Fish and Coastal Migratory Pelagics

Impacts to reef fishes are expected to be minor due to low occurrences of most of the species. Abundance levels for these types, including grouper and snapper fishes, are much higher in the southern and eastern Gulf of Mexico. Juveniles of these species would typically use SAV beds in estuarine environments for food and cover (GMFMC 2004). Given the lack of SAV in the project area, it is unlikely that a substantial presence of juvenile reef species exists in the area. Potential adverse impacts would include short-term, minor displacement of feeding adults and possible infliction to larval fish during the construction process. The proposed marsh creation and oyster shell deployment would benefit gray and lane snapper as they prefer shell/sand bottom and emergent marsh for habitat use in the estuarine zone.

For the migratory pelagic species, habitat use for all life stages is primarily water column, so any adverse impacts from restoration activities would be minor, temporary displacement, and short-term decreased water quality from sediment disturbance. Adults typically only use these shallow areas in the pursuit of baitfish and typically prefer higher-salinity waters (GMFMC 2004). These adverse impacts are expected to transition to intermediate and long-term benefits to the species as a result of habitat creation, preservation, and increased biological productivity.

Shrimp
Potential impacts to shrimp species include migratory disruption and benthic habitat alteration. These adverse impacts are short term and minor in nature. Construction activities would include modifying mud bottom habitat and mixing of sediment in the water column. Post-larvae brown shrimp emigrate to estuaries from February through April on high tides at night and typically leave as sub-adults during full and new moons during different parts of the year. White shrimp have similar patterns, but arrive as post-larvae from May through September both at night and day and in the upper two meters of the water column (GMFMC 2004). Construction and monitoring activities would take precaution to avoid peak migration periods and times of day. Restoration would benefit these species from short to long term. The breakwater would retard marsh edge erosion substantially, preserving this vital microhabitat for juvenile shrimp. Moreover, marsh creation and oyster reef deployment would produce additional habitat that the species could utilize for cover and feeding.

Highly Migratory Species (e.g., sharks)
A majority of the habitat use by all life stages of highly migratory pelagic species (e.g., sharks) is within the water column habitat. However, estuarine habitats are one of many possible habitats used by sharks in early and late juvenile and adult life stages. Estuarine habitat use is likely transitory and temporary during foraging activities. Adverse impacts to highly migratory species EFH would be short term, minor, and localized to the areas of installed breakwaters.

Findings: The NOAA Fisheries has identified EFH habitats for the Gulf of Mexico in its Fishery Management Plan Amendments. The habitat in the project area includes the Mississippi Sound and Gulf of Mexico waters and consists primarily of soft bottom and sandy substrate consistent with sediment along the northern Gulf of Mexico. Based on the phased approach for the implementation of the dredging and disposal activities and the time it would take to complete each phase and the size of the proposed placement areas in relation to the total available acreage of similar habitat within the Gulf of Mexico, it has been determined that the proposed action would not result in long-term adverse effects to EFH.

Essential Fish Habitat (EFH) consultation (Fay 2014) with NFMS' Habitat Conservation Division (HCD) was completed on March 26, 2014. The consultation letter concurred with the EFH assessment that the project may result in minor, adverse short-term impacts to EFH; however, the project is anticipated to result in long-term benefits to EFH. The HCD has no EFH conservation recommendations to provide pursuant to Section 305(b)(2) of the Magnuson-Stevens Act at this time. Further consultation is not necessary unless future modifications are proposed and such actions may result in adverse impacts to EFH. In the EFH Assessment the Trustees stated that the following BMPs would be adhered to:

- Work barges would be moored for overnight and weekends/holidays in areas where previous impacts have occurred (flotation channels, deployment areas).
- Spoil from flotation channels will be placed on the seaward side of the channel to facilitate current-driven backfilling of channels.
- Pilings would be driven instead of jetting to reduce the disturbance of bottom sediments and bottom dwelling organisms.

- Where practicable, shell obtained from commercial vendors that did not or will not impact the aquatic environments will be utilized for reef construction.
- Monitoring will be conducted before, during, and after project implementation to ensure compliance with project design and completion. If immediate post-construction monitoring reveals that unavoidable impacts to EFH have occurred, appropriate coordination with regional EFH personnel will take place to determine appropriate response measures, possibly including mitigation. If additional adaptive management of the breakwater structure is necessary after monitoring evens, all minimization measures discussed above will be followed.
- Any temporary access channels will be filled in naturally following construction to re-establish baseline elevations. Monitoring will assess whether unexpected impacts to EFH have occurred.

10.3.6.11 Human Uses and Socioeconomics

Socioeconomics and Environmental Justice

Affected Resources

Socioeconomic resources combine the social resources and economic resources of the area. The social resources evaluation includes consideration such as potential changes in neighborhoods or community cohesion; affordable housing; changes in travel patterns and accessibility; impacts on community facilities; impacts on traffic safety/public safety; and impacts on any special groups such as elderly, handicapped, minority, and transit-dependent persons. The data in this section was compiled using the Census and American Factfinder websites (U.S. Census Bureau 2011 and 2012).

The project area is located in the southwestern corner of Mississippi, near the communities of Ansley, LaFrance, and Lakeshore, in Hancock County. Ansley and LaFrance are located approximately 1.5 miles north of the project area. Lakeshore is located about two miles to the northeast of the project area.

Based on the U.S. Census 2010 data, there were 42,255 people and 17,166 households in the county. The racial makeup of the county was 88.5 percent White, 7.8 percent Black or African American, 0.5 percent Native American, 1.0 percent Asian, 0.2 percent from other races, and 2.0 percent from two or more races. Hispanic or Latino, of any race, comprised 3.4 percent of the population. Out of the 17,166 households, 27.5 percent had children under the age of 18 living with them, 53.6 percent were married couples living together, 12.2 percent had a female householder with no husband present, and 28.1 percent were non-families. Of the households, 24.5 percent were made up of individuals, and 8.7 percent had someone living alone who was 65 years of age or older. The average household size was 2.50, and the average family size was 2.93. The median age was 41.0 years. The median income for a household in the county was $42,591, and the median income for a family was $52,469. The per capita income for the county was $22,596. About 15.2 percent of families and 18.8 percent of the population were below the poverty line, including 27.6 percent of those under age 18 and 9.2 percent of those aged 65 or older. The labor force in Hancock County totaled approximately 19,813 in 2010.

Industries providing employment in Hancock County were:

- Agriculture, forestry, fishing and hunting, and mining (1.0 percent)
- Construction (13.4 percent)
- Manufacturing (8.1 percent)

- Wholesale trade (2.0 percent)
- Retail trade (9.9 percent)
- Transportation and warehousing and utilities (6.7 percent)
- Information (0.2 percent)
- Finance and insurance, real estate and rental/leasing (6.6 percent)
- Professional, scientific, management, administrative, and waste management services (9.1 percent)
- Educational services, health care, and social assistance (17.2 percent)
- Arts, entertainment, recreation, accommodation, and food services (13.7 percent)
- Other services (4.4 percent)
- Public administration (7.7 percent)

More specifically, the majority of the project is located in Census Tracts 302 and 304. Based on the U.S. Census 2010 data, there were 7,382 people and 3,086 households in these tracts. The racial makeup of these tracts was 76.0 percent White, 20.0 percent Black or African American, <0.1 percent Native American, 0.6 percent Asian, 0.8 percent from other races, and 2.4 percent from two or more races. Hispanic or Latino, of any race, comprised 5.0 percent of the population. Out of the 3,086 households, 23 percent had children under the age of 18 living with them, 44 percent were married couples living together, 15 percent had a female householder with no husband present, and 36 percent were non-families. Of the households, 30 percent were made up of individuals, and 10 percent had someone living alone who was 65 years of age or older. The average household size was 2.43, and the average family size was 2.96. The median age was 42.75 years. The median income for a household in the tracts was $34,582, and the median income for a family was $55,589. The per capita income for the county was $20,406. About 8.5 percent of families and 9.0 percent of the population were below the poverty line, including 14.2 percent of those under age 18 and 13.7 percent of those aged 65 or older. The combined labor force for Census Tracts 302 and 304 was 3,678 in 2010.

Industries providing employment in Census Tracts 302 and 304 were:

- Agriculture, forestry, fishing and hunting, and mining (0.7 percent)
- Construction (15.0 percent)
- Manufacturing (10.4 percent)
- Wholesale trade (1.7 percent)
- Retail trade (10.8 percent)
- Transportation and warehousing and utilities (8.3 percent)
- Information (0.7 percent)
- Finance and insurance, real estate and rental/leasing (5.7 percent)
- Professional, scientific, management, administrative, and waste management services (7.6 percent)
- Educational services, health care, and social assistance (16.9 percent)
- Arts, entertainment, recreation, accommodation, and food services (9.8 percent)
- Other services (3.4 percent)
- Public administration (9.0 percent)

A comparison of race and poverty from Tracts 302 and 304 to Hancock County is shown on Table 10-10.

The nearest communities to the Proposed Action location are Ansley (to the north of Heron Bay) and Lakeshore (to the north of the eastern terminus of the Proposed Action location). These are small communities centered around fishing and recreation. Aerial photography from 2012 was used to count the number of residential structures; Ansley had approximately 19 structures, and Lakeshore had approximately 15 structures. Lakeshore is also the home of the Silver Slipper Casino. A small, unnamed community is located near the LaFrance Marina. This community contained 29 structures as viewed from 2012 aerial imagery. Clermont Harbor, Waveland, and Bay St. Louis are located further to the northeast.

Table 10-10. Comparison of race and poverty of Census Tracts 302 and 304 to Hancock County.

	TRACTS 302 AND 304	HANCOCK COUNTY		TRACTS 302 AND 304	HANCOCK COUNTY
Median household income	$34,582	$42,591	White	76.0%	88.5%
Per capita income	$20,406	$22,596	Black or African American	20.0%	7.8%
Families below poverty line	8.5%	15.2%	Native American	<0.1%	0.5%
Individuals below poverty line	9.0%	18.8%	Other races	0.6%	1.0%
Under 18 below poverty line	14.2%	27.6%	Two or more races	0.8%	0.2%
Over 65 below poverty line	13.7%	9.2%	Hispanic or Latino, of any race	2.4%	3.4%

The closest medical facility near the project area is Fresenius Medical Care at Hancock Medical Center, located at 149 Drinkwater Boulevard in Bay St Louis, approximately 6.5 miles from the eastern edge of the Proposed Action. The closest police department is the Waveland Police Department, located at 335 Coleman Avenue in Waveland, approximately 4.0 miles from the eastern edge of the Proposed Action. The closest fire station is located in Clermont but has a Bay St. Louis address. It is located at 5272 Clermont Boulevard, Bay St Louis, and is approximately 1.3 miles from the eastern edge of the Proposed Action.

Environmental Consequences

There are no anticipated adverse social, economic, health, or environmental impacts to local communities due to this project. During construction, work crews are expected to stay overnight in the cities of Bay St. Louis or Waveland. The nearby communities of Lafrance Marina, Ansley, and Lakeshore would benefit from shoreline protection during storms surges, the creation of new marsh, and from the construction of new oyster reefs. In addition, there could be minor short-term benefits from this project due to temporary employment for local residents and businesses for the construction of the project.

Environmental Justice

The project is primarily in water work located two to three miles from residents, depending on the construction activity. There would be no disproportionate impacts on minority, low-income, or underserved populations.

10.3.6.12 Cultural Resources

Affected Resources

Cultural resources include historic properties listed in, or eligible for listing in the National Register of Historic Places (36 C.F.R. §60[a-d]). The National Historic Preservation Act of 1966, as amended (16 U.S.C. §470[f]), defines an historic property as "any prehistoric or historic district, site, building, structure, or object included in, or eligible for inclusion on the National Register [of Historic Places]." The definition of historic properties also includes significant traditional religious and cultural properties important to Indian tribes. Historic properties include built resources (bridges, buildings, piers, etc.), archaeological sites, and Traditional Cultural Properties, which are significant for their association with practices or beliefs of a living community that are both fundamental to that community's history and a piece of the community's cultural identity. Although often associated with Native American traditions, such properties also may be important for their significance to ethnic groups or communities. Historic properties also include submerged resources.

This project is currently being reviewed under Section 106 of the NHPA to identify any historic properties located within the project area and to evaluate whether the project would affect any historic properties. The Trustee conducted a feasibility review of the project area including a literature review, limited magnetometer surveys, and limited field reconnaissance (R. Christopher Goodwin & Associates, 2014). Previously recorded archaeological sites, shipwrecks, ruins, and obstructions were reviewed. The review of the previously recorded archaeological sites using MDAH records revealed that seven archaeological sites are located within 1.0 mile of the project. Five of the sites are known shell middens; one site is of prehistoric significance, and one site has both historic significance and is a shell midden (Boudreaux III 2009) within one mile of the project area. Within one mile of the project area there are eight charted shipwrecks, one submerged ruin, and five obstructions (NOAA 2012; NOAA 2013). The magnetometer survey revealed submerged anomalies but there were none that are considered significant historic resources.

Environmental Consequences

The National Historic Preservation Act of 1966 (NHPA) charges the federal government with considering the potential effects of its actions on the nation's cultural and historic resources. A complete review of this project under Section 106 of the NHPA is ongoing and would be completed prior to any project activities that would restrict consideration of measures to avoid, minimize or mitigate any adverse effects on historic properties located within the project area. This project would be implemented in accordance with all applicable laws and regulations concerning the protection of cultural and historic resources. A study plan would be developed which could include marine magnetometer surveys, side scan sonar surveys, and field studies to document resources and develop avoidance procedures for the project.

10.3.6.13 Infrastructure

Affected Resources

Infrastructure in the project area consists of two parallel pipelines (Tennessee Gas Pipeline) owned by El Paso Energy Corporation. The pipelines measure 30 inches (western pipeline) and 36 inches (eastern pipeline) in diameter. The pipelines extend underneath a canal ("pipeline canal") from the community of LaFrance to the Mississippi Sound. No other utilities (e.g., pipelines, electricity, telecommunication cables) are known to transect the project area at this time. However, inquiries would be made with resource agencies and other organizations to obtain information on any additional infrastructure.

Environmental Consequences

Either adequate survey information for the pipeline would be obtained prior to construction, or the alignment of the pipeline would be surveyed. The Pearl River-to-Heron Bay breakwater would have a sufficiently wide gap in the structure to avoid covering the pipeline and to allow maintenance vessels to navigate and operate over and around the pipeline if needed. The gap would be wide enough to allow for unimpeded navigation by vessels in and out of the pipeline canal. In addition, proper safety precautions and protocols would be developed, and a safety zone around the pipeline alignments would be set up to keep all construction equipment clear of the pipelines. No adverse impacts are anticipated.

Similar procedures would be utilized if other infrastructure is identified in the project area during inquiries prior to construction.

10.3.6.14 Land and Marine Management

Affected Resources

In the project area, there are residential neighborhoods to the north in the communities of Ansley, Lakeshore, and LaFrance approximately two to three miles from the project area, depending on the construction activity location. In the immediate vicinity of the project area, the surrounding land use is predominantly undeveloped marshland. The Hancock County Marsh Preserve is designated as a Mississippi Coastal Preserves Program. Lands within this Coastal Preserve are either privately, locally, state or federally owned. Much of the property is considered tidal wetlands and is already owned by the state (MDMR 2013). Governing the nature of land use development of the Hancock County Marsh is the 1972 Coastal Zone Management Act (CZMA), which provides for management of the nation's coastal resources and balances economic development with environmental conservation. The overall program objectives of CZMA remain balanced to "preserve, protect, develop, and where possible, to restore or enhance the resources of the nation's coastal zone." The water bottoms are considered state-owned and part of the Public Trust Tidelands.

Environmental Consequences

Implementation of the project would not disrupt existing land uses or wetlands. Impacts to shoreline areas would be beneficial and long term, as the marsh would be protected from erosion.

10.3.6.15 Aesthetics and Visual Resources

Affected Resources

The affected environment consists of the project footprint of Heron Bay, the marsh shoreline from the mouth of the Pearl River to four miles around St. Joseph's Point, and current open water areas seaward of the shoreline as well as areas visible from the footprint. The landscape in the vicinity of the proposed

project area is characterized by a mosaic of marsh wetlands with patches of mature coastal forest, which have the effect of providing visual barriers around existing communities. There are no designated protected viewsheds or historic resources in the vicinity of the project site. Unobstructed views of open water exist generally only from the shoreline. Visual receptors include boaters in the Mississippi Sound; however, the boat traffic density is likely comparatively low due to the distance from urban communities and the shallowness of the water.

Environmental Consequences

During construction, there would be short-term, minor adverse aesthetic and visual impacts for recreational boaters and fishermen due to the use of construction equipment in and around the project area. In addition, the disrupted/disturbed state of the marsh creation site(s) would be a short-term, moderate, adverse aesthetic and visual resource impact. However, the marsh area is anticipated to increase in size and vegetation availability and diversity and become a more robust and thriving marsh habitat once construction is completed. Therefore, there would be a long-term beneficial impact to visual and aesthetic resources once the marsh area reaches maturity.

After construction is completed, the breakwater and/or the intertidal oyster reefs may be exposed at MLW. The outer surface of these reefs consists of natural material such as bagged shells or artificial material such as riprap. Both these materials are present in the natural environment and were once regionally present. The deployed materials would blend well with the surrounding substrate, which would not adversely affect aesthetic and visual resources.

In addition, navigation signs in the project area would alert boaters to the presence of the breakwater (including gaps in the breakwater) and oyster reefs. Because this is an area already used by recreational and commercial boaters, the addition of navigation signs would be consistent with other navigational signage/aids already present in the project vicinity. There would be no long-term impact from sign placement.

10.3.6.16 Tourism and Recreational Use

Affected Resources

The affected resources include the waters and estuaries along the Hancock County marsh shoreline. These resources are used by the public primarily for recreational boating and fishing. Other uses could include bird watching, orienteering, and camping. The community of LaFrance includes a fishing camp and boat launch.

Environmental Consequences

During construction of the breakwater and oyster cultch deployment, there would be short-term, minor adverse impacts to public access and use of open water areas for boat traffic; access would be restricted due to safety concerns. The project should enhance existing recreational use benefits such as boating, fishing, and birdwatching.

Following construction, public access and recreation within the breakwater and subtidal reef areas would have short-term, minor, adverse impacts. Permanent navigation markers or signage would be installed to assure safe navigation for marine traffic. The signs would be pile driven into place and would display the alert, “Danger Breakwater,” in reflective letters on a 3-ft.-by-3-ft. sign face. The signs would

include a marine signal on top. The bottom of the sign would be at an elevation of 6 ft. The signs would have a visibility range of 1 mile.

10.3.6.17 Public Health and Safety and Shoreline Protection

Affected Resources

Approximately 6.2 acres of the Hancock County marsh shoreline are being lost per year due to shoreline erosion (see below). No hazardous materials currently exist at the project area and there is no potential for human exposure to natural or man-made hazards.

Environmental Consequences

The proposed breakwater structures and marsh creation would have long-term benefits by helping to protect the Hancock County marsh complex from wave erosion.

All hazardous materials handled during construction activities (fuel, lubricants, etc.) would be contained and appropriate barriers would be placed to protect the adjacent coastal resources. Best management practices 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 project site. As a result, adverse impacts to public health and safety would not be expected.

10.3.7 Summary and Next Steps

The proposed Hancock County Marsh Living Shoreline project would include shoreline and marsh protection, marsh creation, and restoration resulting in increased benthic secondary productivity. It would use breakwater material to prevent shoreline erosion, create 46 acres of salt marsh habitat, and place 46 acres of oyster cultch in areas that have historically supported oyster habitat. The project is consistent with Alternative 2 (Contribute to Restoring Habitats and Living Coastal and Marine Resources) and Alternative 4 (Preferred Alternative).

NEPA analysis of the environmental consequences suggests that there would be long-term moderate impacts to geology and substrates, and there would be minor to moderate short term adverse impacts to other resource categories. The project would provide long-term benefits by creating approximately 46 acres of salt marsh, 46 acres of oyster habitat, and approximately 5.9 miles (19.9 acres) of reef. The Trustees have completed coordination and reviews under the Endangered Species Act, the Migratory Bird Treaty Act, the Magnuson-Stevens Fishery Conservation and Management Act, the Marine Mammal Protection Act, and the Bald and Golden Eagle Protection Act. Consistency reviews of the proposed Phase III early restoration projects in Mississippi were initiated by the Federal Trustees under the Coastal Zone Management Act and have been completed. The Trustees have initiated consultation under the Historic Preservation Act and other federal statutes. The Trustees have considered public comment and information relevant to environmental concerns bearing on the proposed actions or their impacts. Trustees' determination on selection of this project will be included in the Record of Decision.

Throughout the design process, every practical attempt would be made to avoid and minimize potentially adverse environmental, social, and cultural impacts. The following conservation measures and BMPs (sorted by resource type) would be implemented to minimize impacts to resources:

- Green House Gas Emissions
    - Shut down idling construction equipment, if feasible.
    - Locate staging areas as close to construction sites as practicable to minimize driving distances between staging areas and construction sites.
    - Encourage the use of the proper size of equipment for the job to maximize energy efficiency.
    - Encourage the use of alternative fuels or power sources for generators at construction sites, such as propane or solar power, or use electrical power where practicable.
- Marine Mammals
    - If manatee(s) are found to be present in the immediate project area during restoration activities, construction would be halted until the species moves away from the project area.
- Protected Species
    - Awareness of potential turtle presence. If any sea turtles are found to be present in the immediate project area during restoration activities, construction will be halted until species moves away from project area.
    - Awareness of manatee presence. If manatee(s) are found to be present in the immediate project area during restoration activities, construction will be halted until species moves away from project area. For in-water work in Mississippi where manatees could be present, the Trustee will follow conditions a, b, c, and d of the Standard Manatee Conditions for In-water Work (USFWS, 2011). The Trustee would report any collisions to the U.S. Fish and Wildlife Service or State trust resource agency. Temporary signs, if necessary, would be modified from the standard template to reflect local conditions.
    - Measures to protect Gulf Sturgeon. Project restoration features will be built close to the shoreline in shallow water (1-4 feet) and will not impede any migratory paths. Project components will be constructed in the months of May through October to the extent practicable, to avoid inter-riverine migration movements. Project construction activities will be subject to a stop work order if the species is observed in the project footprint. Work will continue once the species leaves the area.
    - If construction activities continued beyond the May to October window, there would be continued adherence to special conditions specified in the Sea Turtle and Smalltooth Sawfish Construction Conditions, dated March 23, 2006 (NMFS, 2006).
    - The project will follow Measures for Reducing Entrapment Risk to Protected Species, revised May 22, 2012 (NMFS, 2006).
- Migratory Birds
    - Pre-construction nesting surveys for migratory birds and raptors would be conducted and if evidence of nesting is found, coordination with the USFWS would be initiated to develop and implement appropriate conservation measures.
- Essential Fish Habitat
    - Work barges would be moored for overnight and weekends/holidays in areas where previous impacts have occurred (flotation channels, deployment areas).
    - Spoil from flotation channels will be placed on the seaward side of the channel to facilitate current-driven backfilling of channels.

    - Pilings would be driven instead of jetting to reduce the disturbance of bottom sediments and bottom dwelling organisms.
    - Where practicable, shell obtained from commercial vendors that did not or will not impact the aquatic environments will be utilized for reef construction.
    - Monitoring will be conducted before, during, and after project implementation to ensure compliance with project design and completion. If immediate post-construction monitoring reveals that unavoidable impacts to EFH have occurred, appropriate coordination with regional EFH personnel will take place to determine appropriate response measures, possibly including mitigation. If additional adaptive management of the breakwater structure is necessary after monitoring evens, all minimization measures discussed above will be followed.
    - Any temporary access channels will be filled in naturally following construction to re-establish baseline elevations. Monitoring will assess whether unexpected impacts to EFH have occurred.
- Invasive Species
    - All equipment to be used during the project, including personal gear, will be inspected and cleaned such that there is no observable presence of mud, seeds, vegetation, insects and other species.
    - Oyster cultch and vegetation will be treated or inspected to remove "non-target" species.
- General Construction BMPs
    - Spoil from temporary flotation channels would be placed on the seaward side of the channel to facilitate current-driven backfilling of channels.
    - Placement of all signage pilings would be achieved by "driving" in lieu of "jetting" to reduce the disturbance of bottom sediments and bottom-dwelling organisms.

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10.4 Restoration Initiatives at the INFINITY Science Center: Project Description

10.4.1 Project Summary

The proposed project, Restoration Initiatives at the INFINITY Science Center, would provide the public enhanced and increased access to coastal natural resources injured by the Spill and response actions. The goal is to restore lost recreational opportunities through the provision of increased access to coastal estuarine habitats, wildlife viewing areas and educational features. The project would enhance and expand a state-of-the-art interactive science, education, interpretive, and research center for use by visitors seeking to experience and learn about the coastal natural resources of the Gulf of Mexico. The project also would serve as a launching point for a comprehensive scenic byway trail system that can take visitors to beaches and tidal coastal estuarine environments. The INFINITY Science Center is located in Hancock County, Mississippi, and is adjacent to the Hancock County Marsh Preserve and coastal estuarine habitats. The INFINITY Science Center is a partnership between public and private entities such as NASA, the State of Mississippi, and private funders. The estimated cost for the Restoration Initiatives at INFINITY Science Center Early Restoration project is $10,400,000.

10.4.2 Background and Project Description

The INFINITY Science Center is located southwest of the intersection of Highway 607 and Interstate 10 in southern Hancock County, Mississippi, and is adjacent to coastal estuarine habitats including the Hancock County Marsh Preserve. The project site is bordered by the Pearl River to the west and is adjacent to the "Logtown Scenic Byway to Space" trail to the south to facilitate beach access through the scenic byways in Hancock County, Mississippi. The majority of the total available gallery space in the INFINITY Science Center would be reserved for exhibits about the Gulf of Mexico and its coastal ecosystem. Exhibits would cover a number of topics including marsh ecosystems, oceanography, gulf species, hurricanes, and restoration monitoring. These exhibits would be designed to allow visitors (using computers, simulations, and graphics) to experience how scientists model and study the Gulf's ecosystem. The exhibits would highlight the importance of science and scientific research, natural processes, and environmental stewardship, as well as wise economic utilization of these resources.

The Heritage Trail-Possum Walk would bring visitors through multiple coastal habitats that occur throughout the immediate area including marsh, bayhead swamp, cypress swamp, and pine flatwoods. The proposed project would enhance access to a coastal trail system that connects with sandy beach habitats. The Heritage Trail-Possum Walk would include a public Outdoor Education Center to inform visitors of the ecologically sensitive nature of coastal habitats injured by the Spill and response action (Figure 10-5 and Figure 10-6). The project also includes development of a native landscape/nursery area.

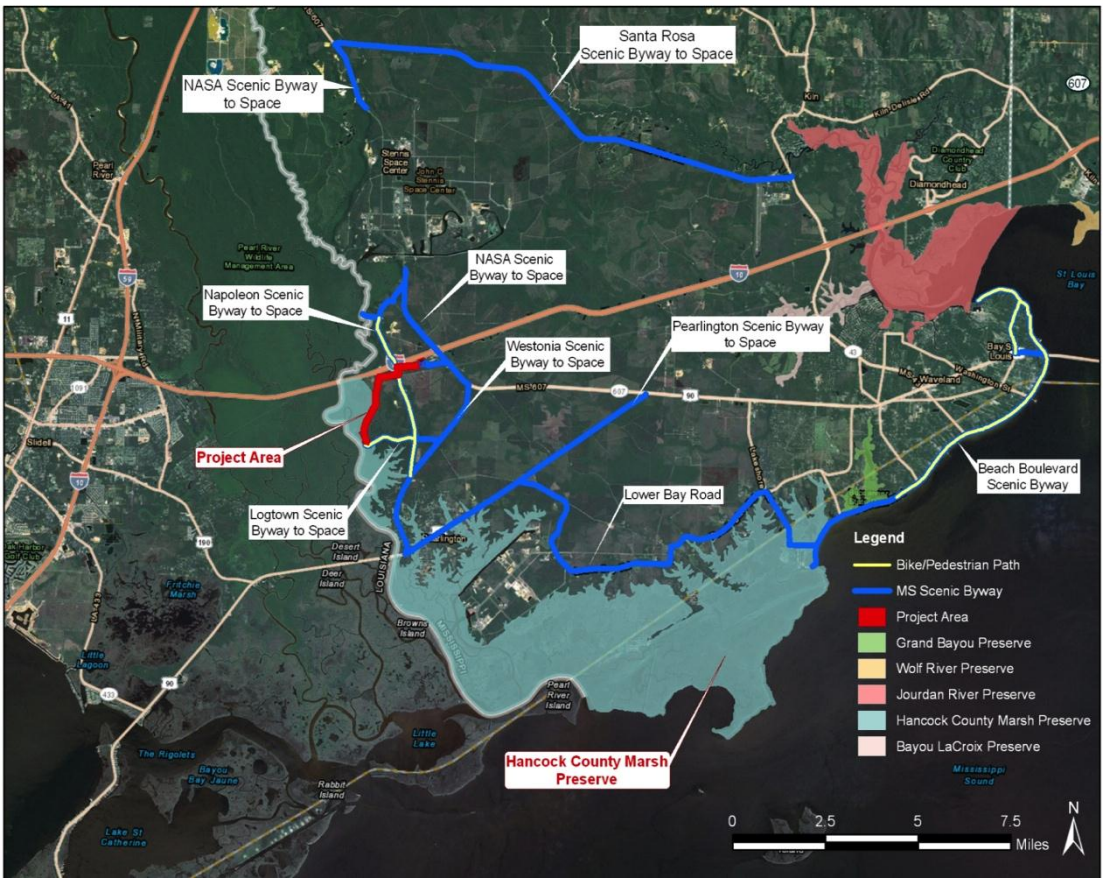

Figure 10-5. The Proposed Restoration Initiatives at INFINITY Science Center would include improvements to the Heritage Trail-Possum Walk, an extension of the scenic byway system that provides access to the Hancock County Marsh Preserve, coastal beaches, and estuarine marshes.

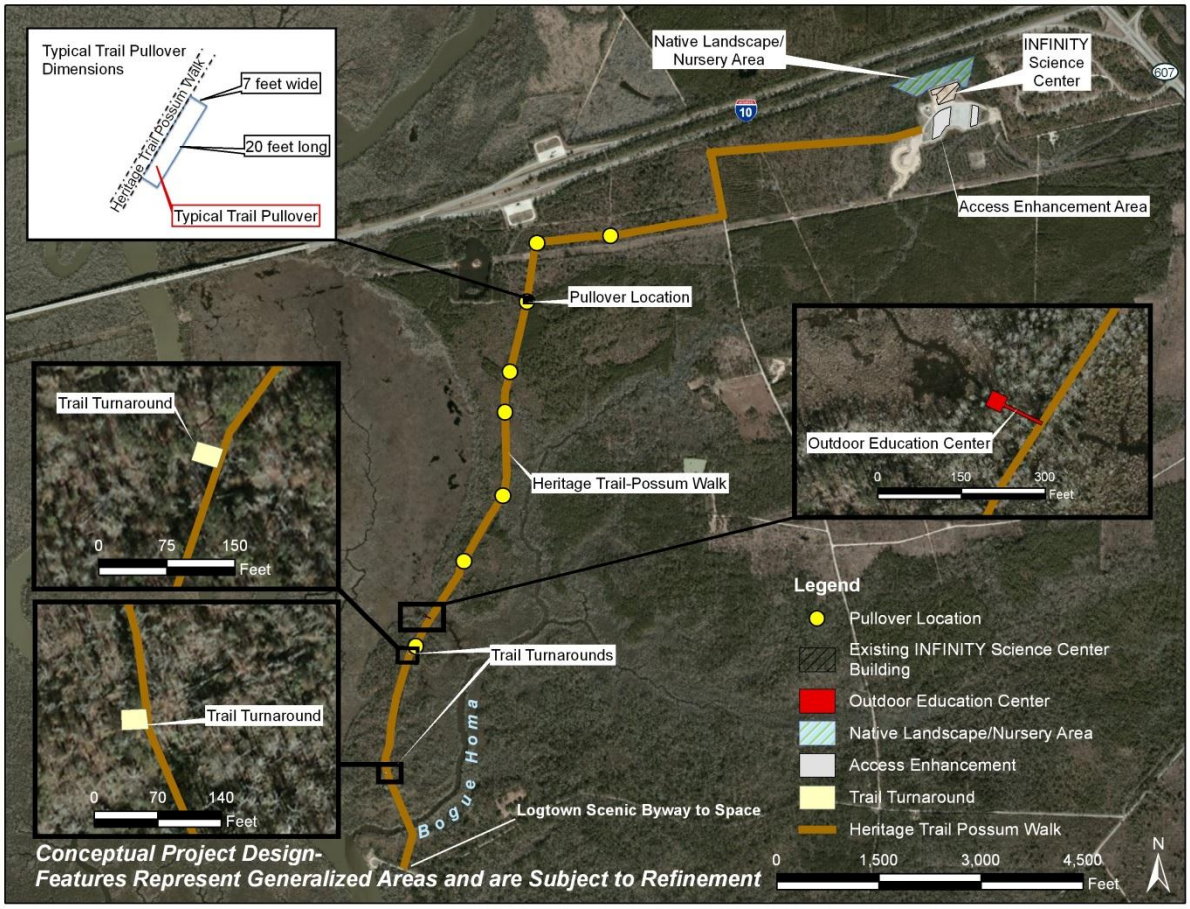

Figure 10-6. Location of proposed project, Restoration Initiatives at INFINITY Science Center.

10.4.3 Evaluation Criteria

As a result of the Spill, the public's access to and enjoyment of natural resources along the Mississippi Gulf Coast were denied or severely restricted. This project meets the evaluation criteria established for OPA and the Framework Agreement. The project would enhance recreational and educational opportunities and would promote the public's appreciation and awareness of the Gulf of Mexico's natural resources injured by the Spill. (Section 7.1; Table 7.1). Accordingly, the project is intended to replace or provide recreational opportunities comparable to the types of opportunities lost as a result of the Spill (see C.F.R. § 990.54(a) (2) and Sections 6a-6c of the Early Restoration Framework Agreement). The project is technically feasible and utilizes proven techniques with established methods and documented results and can be implemented with minimal delay. Cost estimates are based on similar past projects, and the project can be conducted at a reasonable cost. For these reasons, the project has a high likelihood of success and is feasible and cost-effective; see C.F.R. § 990.54(a) (1) and a(3) and Section 6e of the Framework Agreement. A thorough environmental review, including review under applicable environmental statutes and regulations, as described in section 10.5, indicates that adverse effects from the project would largely be minor, localized, and often of short duration. In addition, the best management practices and measures to avoid or minimize adverse effects described in 10.5 would be implemented. As a result, collateral injury would be avoided and minimized during project

implementation (construction and installation and operations and maintenance) (15 C.F.R. § 990.54(a)(4)). In addition, this project is consistent with long-term restoration goals (see Section 6(d) of the Framework Agreement). This project would not negatively affect public health and safety (see Section 3.3.6 Public Health and Safety). This project was submitted as a restoration project on the NOAA website (http://www.gulfspillrestoration.noaa.gov).

10.4.4 Performance Criteria, Monitoring and Maintenance

The project's restoration objectives are to enhance and increase recreational opportunities as well as the public's appreciation and awareness of the Gulf of Mexico's natural resources. Successful completion of the project would enhance public use and enjoyment of these resources. This project includes monitoring efforts to ensure project designs are correctly implemented during construction to meet the stated restoration objectives. Further, the project would be monitored for visitor counts and facility usage at the INFINITY Science Center and its resources. Monitoring would include calculating the number of visitors to the INFINITY Science Center indoor facility/exhibits and the number of visitors using the Heritage Trail-Possum Walk and proposed Outdoor Education Center. Visitation and public use of the facilities and associated amenities would be monitored for five years following completion of construction. The INFINITY Science Center would be responsible for maintaining the Science Center facilities, features, and exhibits.

10.4.5 Offsets

NRD Offsets are $15,600,000, expressed in present-value 2013 dollars, based on a benefit-to-cost ratio of 1.5, to be applied against the monetized value of lost recreational use provided by natural resources injured in Mississippi, which would be determined by the Trustees' assessment of lost recreational use for the Spill. Please see Chapter 7 of this document (Section 7.2.2) for a description of the methodology used to develop monetized Offsets.[5]

10.4.6 Cost

The total estimated cost to implement this project is $10,400,000. This cost reflects current cost estimates developed from the most current information available to the Trustees at the time of the project negotiation. The cost includes provisions for planning, engineering and design, construction, exhibit development, monitoring, and potential contingencies.

[5] For the purposes of applying the NRD Offsets to the calculation of injury after the Trustees' assessment of lost recreational use for the Spill, the Trustees and BP agree as follows:

- The Trustees agree to restate the NRD Offsets in the present value year used in the Trustees' assessment of lost recreational use for the Spill.
- The discount rate and method used to restate the present value of the NRD Offsets will be the same as that used to express the present value of the damages.

10.5 Restoration Initiatives at the INFINITY Science Center: Environmental Review

10.5.1 Introduction and Background

INFINITY Science Center (INFINITY) is a state-of-the-art, interactive science, research, education, and interpretive center located in Hancock County and adjacent to the Hancock County Marsh Preserve. Restoration Initiatives at the INFINITY Science Center is intended to restore lost recreational opportunities through the provision of enhanced and increased access to coastal estuarine habitats, wildlife viewing areas, and educational features lost as a result of the Spill. The Heritage Trail-Possum Walk would bring visitors through multiple coastal habitats that occur throughout the immediate area including marsh, bayhead swamp, cypress swamp, and pine flatwoods. The proposed project would enhance access to a coastal trail system that connects with sandy beach habitats.

The project description is based on the current design concept for the purpose of assessing the construction impact on the environment. Final engineering and project design could result in revisions to the project. The following description is intended to be a conservative review of the project components in order to evaluate a maximum environmental impact in the NEPA review and in environmental permitting. Project refinement(s) are anticipated as part of the design process. To the extent possible, revisions would be restricted to the current project footprint. The proposed project includes the following elements:

- *Exhibits:* The project funding would also be used to develop educational components within the available gallery space in INFINITY. Exhibits would educate the public and build public appreciation relating to Gulf resources, the Spill's NRDA, restoration actions, and restoration monitoring activities for Deepwater Horizon restoration projects. Exhibits will cover a number of topics including marsh ecosystems, oceanography, gulf species, hurricanes, and restoration monitoring. These exhibits would be designed to allow visitors (using computers, simulations and graphics) to experience how scientists model and study the Gulf's ecosystem.
- *Native Landscape/Nursery Area:* The Native Landscape Nursery Area is located between I-10 and the front of the INFINITY Science Center. The area would have three major elements: education, restoration and a cultural component. The creation of an open water/emergent wetland area would be a nursery of native wetland vegetation for both hands-on outdoor education and potential use plant materials in future restoration activities. The Native Landscape Nursery Area contributes recreational uses including but not limited to access to coastal wetland habitats, educational opportunities about wetland restoration, cultural preservation of historic features (rails, historic corridor), bird watching, wildlife observation and others.
- *Boardwalk and Outdoor Education Center:* The Outdoor Education Center would provide an outdoor classroom on the edge of the coastal Hancock County Marsh Preserve. The facility makes possible educational opportunities and awareness of the Gulf's ecosystems and natural resources in a hands-on, outdoor classroom adjacent to the Hancock County Marsh Preserve. Other uses include bird and wildlife observation and scenic viewing of natural resources. Construction of public Outdoor Education Center along the Heritage Trail-Possum Walk is intended to educate visitors of the ecologically sensitive coastal habitats injured by the Spill and response actions.

- *Heritage Trail-Possum Walk:* Enhancements would include paving of the existing Heritage Trail-Possum Walk to provide vehicular access to the Outdoor Education Center. The Heritage Trail-Possum Walk is a segment of a planned coast-wide Heritage Trail system. Uses would include access to coastal wetlands at the Outdoor Education Center, access via in the Heritage Trail-Possum Walk to coastal and estuarine habitats, bird/wildlife observation and other uses including running, hiking and biking. The project includes the construction of two areas along the Heritage Trail-Possum Walk for use as turnarounds to transport visitors on learning tours organized by INFINITY. Vehicular access would consist of golf carts used to transport visitors to the Outdoor Education Center via the paved Heritage Trail-Possum Walk.
- *Access Enhancement:* Access enhancements will include improvements to parking at the INFINITY Science Center to better accommodate large group educational visits (school buses) and ease of access to the INFINITY Science Center.

10.5.2 Project Location

The proposed project is located in the state of Mississippi, in Hancock County, southwest of the intersection of Highway 607 and Interstate 10 (latitude 30.311571N, longitude 89.604742W; Figure 10-7). The project site is bordered by the Pearl River to the west and would connect to the "Logtown Scenic Byway to Space" trail to the south to facilitate beach access through byways in Hancock County and adjacent to the Hancock County Marsh Preserve.

As described in the *John C. Stennis Space Center Environmental Resources Document* (NASA 2012), the Stennis Space Center (SSC) buffer zone includes all land within six miles of the smaller Stennis Space Center Fee Zone (Figure 10-7). The Restoration Initiatives fall within the SSC buffer zone. Using a perpetual restrictive easement, the buffer zone was originally developed to provide a cushion for safety and acoustic reasons between the rocket testing activities within the Fee Zone and surrounding human habitation. Although ownership of land within the buffer zone is a mix of federal government, private individuals, and corporations, the perpetual restrictive easement prohibits any "maintenance or construction of dwellings and other buildings suitable for human habitation" (NASA 2012).

The northern extent of the Mississippi Department of Marine Resources (MDMR) Hancock County Marsh Coastal Preserve is located within the project area; it spans land from the Pearl River east to the Bogue Homa Creek to Hancock County marsh in the Mississippi Sound. The project area in relation to the Stennis Buffer Zone and the Hancock County Marsh Coastal Preserve is shown in Figure 10-7.

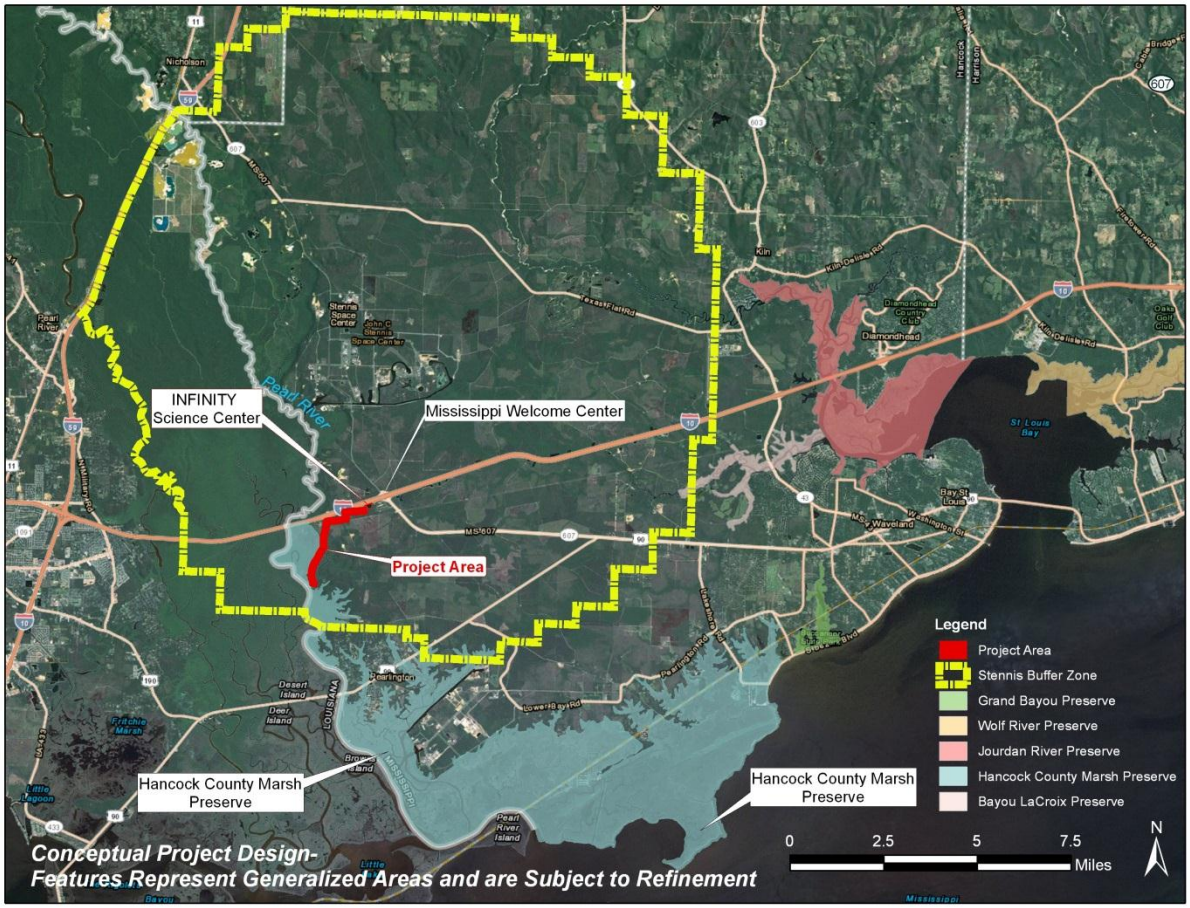

Figure 10-7. Site vicinity map for Restoration Initiatives at INFINITY Science Center. Stennis Buffer Zone and the Hancock County Marsh Coastal Preserve.

10.5.3 Construction and Installation

Project elements, their approximate size, habitat, location, and associated construction activities are summarized in Table 10-11 and are described in more detail below. Construction methods and activities are included in order to assess the impact on the environment. Actual construction methods and activities would be determined after final design and would likely be comparable to activities described below. It is expected that actual construction methods would be similar to those presented in this section.

10.5.3.1 Native Landscape/Nursery Area

Land would be graded to create a native landscape/nursery area between Interstate 10 and INFINITY. The area of approximately 6.5 acres would be cleared and grubbed using a track-mounted light dozer, Bobcat, and front-end loader or similar equipment; pond areas would be dewatered; walkways would be graded; fill material would be added to the edge of the site; and the site would be landscaped with native vegetation and other amenities. The remaining wetland would be preserved for educational purposes. This element of the project has been previously authorized by USACE.

Table 10-11. Project element summary for Restoration Initiatives at INFINITY Science Center.

PROJECT ELEMENT	SIZE (APPROX.)	HABITAT/LOCATION	CONSTRUCTION ACTIVITIES
Museum Exhibits	N/A	Within existing INFINITY Science Center	Installation of exhibits; various topics earth and ocean science, monitoring
Native Landscape/Nursery Area	6.5 acres	Wetland/uplands; dummy line railroad between Interstate 10 and INFINITY	Clearing of stumps; pond excavation; preserve some wetland and dummy line railroad; trail construction through area
INFINITY Science Center Access Enhancement/Parking Area	4.5 acres	Existing stone parking lot/INFINITY Science Center	Paving: 1-inch new stone cap; 2 inch of base; 1 inch wearing course
Heritage Trail-Possum Walk	2.9 miles, 2.6 acres	Existing trail roadbed through forested upland/wetland habitat	Asphalt paving of existing stone based trail; Clearing/grading to create two 25-ft. x 30-ft. turnarounds; trail pullovers
Boardwalk and Outdoor Education Center	75 linear ft. of boardwalk, 5 ft. wide; 40-ft. x 40-ft. platform; Total acreage 0.05	Cypress swamp abutting Pearl River marsh	Conventional post and beam pier; pressure-treated materials; 70 helical piers at 10 to 12 inches

10.5.3.2 Access Enhancement

Access enhancement would include paving the existing parking area. The total area is approximately 4.5 acres. Stormwater from the parking area currently drains to a retention basin to the southwest. Stormwater treatment would not be altered. Activities would include surveying the area to be paved, compacting and proof-rolling the sub-base, placing asphalt consisting of 2 inches of base and a 1-inch wearing course, and striping the parking and handicap zones.

10.5.3.3 Heritage Trail-Possum Walk

The existing Heritage Trail-Possum Walk is approximately three miles long. The first 2.9 miles consist of a coarsely graded sandy/stone base material suitable for foot traffic, bicycles, wheel chairs and four-wheeled noncombustible vehicles. The last 0.1-mile of the trail consists of a wooden boardwalk across marsh connected to a wooden bridge that spans the Bogue Homa River – neither of which are rated for four-wheeled vehicular traffic. The first section of the Heritage Trail-Possum Walk would be paved with asphalt. At 2.9 miles in length and 7 ft. wide, this section of trail has an area of 2.6 acres. The trail is bordered on each side by continuous creosote railroad cross ties pinned to the ground with rebar that would act as side forms for the asphalt to be placed against. It is expected that the established trail would require only limited grading and compacting. Stormwater would run off from the trail and percolate into the ground or collect in nearby drainages. The trail is naturally vegetated on both sides.

In addition to the trail paving discussed above, “trail pullovers” would also be constructed to allow for two-way traffic. The two-way traffic would consist of four-wheeled vehicles used to transport visitors and school children to the Outdoor Education Center. These pullovers are a safety measure to facilitate transporting the public in the event of an accident or health-related incident in the remote reaches of the trail. The trail pullovers would be placed in previously cleared upland areas to minimize disturbance to vegetation and wetlands. The trail pullovers would be constructed within the trail’s existing corridor, attached to the trail, and would be approximately 20 ft. long by 7 ft. wide.

Trail Turnarounds

Turnarounds are necessary to accommodate four-wheeled vehicles on the 7-ft.-wide trail. Two turnarounds would be constructed in previously cleared upland areas. Each turnaround would have an area of approximately 0.01 acre (25 ft. by 30 ft.). Activities would include grading, placing a stone base, and paving with asphalt.

10.5.3.4 Boardwalk and Outdoor Education Center

A boardwalk and an Outdoor Education Center would be installed in a cypress swamp. The boardwalk on pilings would be approximately 70 ft. long and 5 ft. wide and would be constructed of a conventional helical pier installation serving as its foundation, followed by pressure-treated framing, and capping with a recycled composite decking lumber and associated handrails. The helical pier foundation system is used almost exclusively in environmentally sensitive areas for the following reasons:

- No soil excavation
- Minimal impact on vegetation
- Can be installed in limited access areas
- System is economical in sensitive soils and difficult terrain
- Galvanized steel anchors are engineered to transfer projected loads to bearing capable strata below weak soils

Modern, compact hydraulic-driven equipment such as a Bobcat on “floats” would be used to install the piers without excessive vibration or other intrusive noises.

To avoid shading the marsh, an Outdoor Education Center (40 ft. by 40 ft. by 2 stories) would be constructed at the end of the boardwalk where the cypress swamp interfaces with the marsh. The construction approach for the base platform would be similar to the approach used for the boardwalk. The remaining two-story structure on top of the platform would consist of conventional post-and-beam construction comprised of pressure-treated framing lumber, recycled composite decking, and galvanized hardware.

All construction materials would be delivered to the site using small vehicles to accommodate the narrow width of Heritage Trail-Possum Walk and to inflict minimal intrusion on the environment.

10.5.4 Best Management Practices

Throughout the design process, every practical attempt would be made to avoid and minimize potentially adverse environmental, social, and cultural impacts. The BMPs and conservation measures that will be utilized to minimize impacts to resources are listed in Section 10.5.7, Summary and Next Steps.

10.5.5 Operations and Maintenance

10.5.5.1 Native Landscape/Nursery Area

Visitors would access this area through INFINITY Science Center, and the area would be open to the public during the INFINITY Science Center's hours. General landscape maintenance would include suppression of unwanted vegetation and invasive species using a combination of mechanical and chemical means, watering during the first growing season, periodic watering when needed during times of drought, and regular management to establish native plants in the area. Maintenance and security would be provided by INFINITY staff or subcontractors.

10.5.5.2 Access Enhancement

The parking area would be open from sunrise to sunset. The pavement would be routinely checked for cracking, sinking, and disrepair. Upon detection of any pavement deformities, appropriate action would be taken to ensure the safety of visitors. Maintenance and security would be provided by INFINITY staff or subcontractors.

10.5.5.3 Heritage Trail-Possum Walk

The trail would be open from sunrise to sunset. The trail would be accessed directly by way of the INFINITY parking lot. The pavement would be routinely checked for cracking, sinking, and disrepair, and any problems would be repaired. Maintenance and security of the trail would be provided by INFINITY staff or subcontractors.

Outdoor Education Center and Boardwalk

The trail would be open from sunrise to sunset. The boardwalk and Outdoor Education Center would be routinely monitored for general wear and tear that might make the features unsafe or unsightly. Upon detection of any deformities, appropriate action would be taken to ensure the safety of visitors. Maintenance and security would be provided by INFINITY staff or subcontractors.

10.5.6 Affected Environment and Environmental Consequences

Under the NEPA, federal agencies must consider environmental effects of their actions that include, among others, impacts on social, cultural, and economic resources, as well as natural resources. The following sections describe the affected resources and environmental consequences of the project.

10.5.6.1 No Action

Both OPA and NEPA require consideration of the No Action alternative. For this Final Phase III ERP proposed project, the No Action alternative assumes that the Trustees would not pursue the Restoration Initiatives at INFINITY Science Center as part of Phase III Early Restoration.

Under the No Action alternative, the existing conditions described for the project site in the affected resources subsection would prevail. Restoration benefits associated with this project would not be achieved at this time.

10.5.6.2 Physical Environment

Geology and substrates, hydrology, water quality, air quality, greenhouse gas emissions, and noise will be discussed in this section

Affected Resources

Geology

The project area is located within the Gulf Coastal Plain physiographic region. Landforms are generally comprised of Holocene sediments. These sediments are composed of sand, silt, and clay with comparatively high organic matter content (Schmid 2013).

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

Substrates

Data from the Mississippi State Geological Survey (MSGS) indicates that surface soils generally consist of Holocene-age quaternary coastal deposits of loam, sand, gravel, and clay. The United States Department of Agriculture (USDA) Natural Resource Conservation Service (NRCS) Web Soil Survey indicates that the soils are mainly silt loams and fine sandy loams that are associated with tidal flats, coastal plains, terraces, stream terraces, and ridges. These soils include drainage classes of very poorly drained (tidal flat), poorly drained (terrace), somewhat poorly drained (coastal plain), moderately well drained (stream terrace and coastal plain), and well drained (ridges).

The Web Soil Survey identifies nine soil-mapping units within the footprint of the proposed project. These soil map units located within the project footprint area are: Beauregard silt loam; Escambia loam, 0 to 2 percent slopes; Guyton silt loam; Handsboro association; Harleston fine sandy loam, 0 to 2 percent slopes; Poarch fine sandy loam, 0 to 2 percent slopes; Poarch fine sandy loam, 2 to 5 percent slopes; Saucier fine sandy loam, 0 to 2 percent slopes; and Saucier fine sandy loam, 2 to 5 percent slopes (NRCS 2013a). Of these soils, the Guyton silt loam and Handsboro association soil are listed as hydric and minor inclusions of the Beauregard silt loam; Escambia loam, 0 to 2 percent slopes; Harleston fine sandy loam, 0 to 2 percent slopes; Poarch fine sandy loam, 0 to 2 percent slopes; and Saucier fine sandy loam, 0 to 2 percent slopes are listed as hydric (NRCS 2013b). Soils and their limitations are listed in Table 10-12.

Environmental Consequences

Native Landscape/Nursery Area

Construction would require the dewatering and grading of the 6.5-acre area along with the placement of fill material. Clearing and grubbing would use a track-mounted dozer to mitigate soil compaction; however, the soils would be disturbed. Vegetation would be planted to stabilize the soil. Any necessary fill material would be clean and would likely originate from the area. There would be impacts to the soil in this area; however, over time the soil should become more similar to existing wetland soils. Adverse soil impacts would be short term, minor and localized to the area of soil disturbance and placement of fill.

Table 10-12. Soils characteristics—Restoration Initiatives at the INFINITY Science Center.

SOIL TYPE	TEXTURE	PERMEABILITY	LIMITATIONS
Beauregard silt loam	Silt Loam (upper) Silty Clay Loam (lower)	Moderate (upper) Slow (lower)	Severe limitations for urban use due to wetness
Escambia loam, 0 to 2 percent slopes	Loam (upper) Clay Loam (lower)	Moderate (upper) Slow (lower)	Moderate limitations for urban use; severe limitations for septic tank fields
Guyton silt loam	Silt Loam (upper) Silty Clay Loam (lower)	Slow (upper) Slow (lower)	Severe limitations for urban use due to wetness
Handsboro association	Organic Material (upper) Organic Material and Loam	Moderate (upper) Moderately Slow (lower)	Severe limitations for urban use due to wetness
Harleston fine sandy loam, 0 to 2 percent slopes	Fine Sandy Loam (upper) Sandy Clay Loam (lower)	Moderate (upper) Moderately Slow (lower)	Moderate limitations for urban use due to wetness
Poarch fine sandy loam, 0 to 2 percent slopes	Fine Sandy Loam (upper)	Moderate (upper) Moderately Slow (lower)	Moderate limitations for urban use due to wetness
Poarch fine sandy loam, 2 to 5 percent slopes	Fine Sandy Loam (upper)	Moderate (upper) Moderately Slow (lower)	Moderate limitations for urban use due to wetness
Saucier fine sandy loam, 0 to 2 percent slopes	Sandy Loam (upper) Sandy Clay Loam (lower)	Moderate (upper) Slow (lower)	Moderate limitations for urban use due to wetness
Saucier fine sandy loam, 2 to 5 percent slopes	Sandy Loam (upper) Sandy Clay Loam (lower)	Moderate (upper) Slow (lower)	Moderate limitations for urban use due to wetness

Access Enhancement

Approximately 4.5 acres of existing stone parking lot would be covered with asphalt. There would be long-term, minor, adverse impacts on soils by completely covering the gravel surface with asphalt.

Heritage Trail-Possum Walk

During construction activities, the soil in the area of the pullovers and turnarounds would be compacted and covered with stone and asphalt. The existing stone on the Heritage Trail-Possum Walk and the soil on the pullovers and turnarounds would be covered with asphalt. There would be long-term, minor adverse impacts on approximately 2.6 acres of soils by completely covering the soil surface with asphalt.

Boardwalk and Outdoor Education Center

Heavy equipment would not be required off the trail for the construction. There would likely be some short-term adverse impacts to soils and sediment due to the construction of the education center and boardwalk and minor compaction by foot traffic and placement of supplies. Piers would be installed with a helical pier foundation system, which would avoid soil excavation and reduce the impact to vegetation.

Findings

During construction activities there would be short-term, minor and localized impacts to the area of soil disturbance and placement of fill. Installation of new pavements would cause long-term, minor, adverse impacts to approximately 7.1 acres of soils.

10.5.6.3 Hydrology and Water Quality

Affected Resources

Hydrology

The proposed project area is located within the Pearl River Watershed Basin and the Lower Pearl Sub-basin. This basin is characterized as estuarine, is bounded by salt marsh, and is tidally influenced. The waters are classified as "fish and wildlife use" streams by the MDEQ (MDEQ 2007) and are considered to be of fair to good water quality. Waters in this classification are intended for fishing and for the propagation of fish, aquatic life, and wildlife (NASA 2006).

The Lower Pearl River Watershed has a drainage area of approximately 8,760 square miles (PRBDD 2013) and includes portions of Washington, Hancock, Lamar, Marion, and Pearl River counties in Mississippi. Major tributaries within the Lower Pearl River Watershed include Yockanookany River, Lobutcha Creek, Strong River, and Bogue Chitto River.

The proposed project area is situated on mostly bottomlands east of the Pearl River and Bogue Homa (a tributary to the Pearl River). The Logtown, Mississippi, U.S. Geological Survey (USGS) quadrangle map shows that the site elevation ranges from approximately 5 ft. above mean sea level (msl) nearer to the Pearl River to 20 ft. above msl near INFINITY. Drainage from the project area is to the Bogue Homa tributary to the Pearl River. The Pearl River drains into the Gulf of Mexico approximately 15 river miles to the southeast of the project area.

Several aquifers can be traced through Hancock County, Mississippi. The area is underlain by fresh water-bearing, southward-tipping sands of the Miocene and Pliocene ages. Within these fresh water-bearing sands, one unconfined aquifer is found near the surface with ten or more confined aquifers at a greater depth. The fresh water-bearing zone is 600 to 900 meters (2,000 to 3,000 ft.) thick. Individual aquifers range from 30 to 140 meters (100 to 450 ft.) in thickness, with most measurements closer to 30 meters. The aquifers have plentiful, almost untapped supplies of freshwater (NASA 2006).

Water Quality

Mississippi's water quality standards specify the appropriate levels for which various water quality parameters or indicators support a water body's designated use(s). The Bogue Homa is the nearest named tributary and is not included on the 303(d) List of Impaired Water Bodies (MDEQ 2012). The project area has nearby streams designated for "fish and wildlife use" (MDEQ 2007) in the Pearl River Basin. Waters in the fish and wildlife classification are intended for fishing and for propagation of fish, aquatic life, and wildlife.

Floodplains

The project is located in Federal Emergency Management Agency (FEMA) designated Flood Zones according to the Flood Insurance Rate Maps (FIRMs) for Hancock County (FEMA 2013). The project is located in FIRM panel numbers 28045C0303D and 28045C0315D (both with an effective date of October 16, 2009). Specifically, the project area is located in Zones X and AE with base flood elevations ranging from 14 to 15 ft. Zone X indicates areas of moderate flood hazard, usually the area between the limits of the 100-year and 500-year floods. Zone AE indicates areas that are subject to inundation by the 1-percent-annual-chance flood event. Mandatory flood insurance purchase requirements and floodplain management standards apply.

Wetlands

The main types of wetlands located throughout the project area are palustrine emergent, scrub shrub, and forested wetlands. A majority of the wetlands occur in the Pearl River floodplain, which is part of the Hancock County Marsh Preserve.

Palustrine Emergent Wetlands

The majority of the palustrine emergent wetlands near or within the project area are located in the Pearl River floodplain, which is adjacent to the Heritage Trail-Possum Walk (Figure 10-8). Dominant species of this type of wetland generally include cattails (*Typha* spp.) and rushes (*Juncus* spp.). These areas are seasonally or permanently flooded by shallow water resulting from precipitation, low elevation, and a high water table. Trail users would have exposure to a view of the expansive marsh from the Outdoor Education Center.

Palustrine Forested/Scrub Shrub Wetlands

Palustrine forested/scrub shrub wetlands occur primarily in the floodplains of the Pearl River and the Bogue Houma and tributaries. Dominant species include bald cypress (*Taxodium distichum*), pond cypress, and water tupelo (*Nyssa aquatic*). Black willow (*Salix nigra*), palmetto (*Sabal minor*), buttonbush (*Cephalanthus occidentalis*), poison ivy (*Toxicodendron radicans*), honeysuckle (*Lonicera japonica*), and grapes (*Vitis* sp.) are dominant species in the understory. The areas are seasonally or permanently flooded by shallow water. Specific types of palustrine forested/scrub shrub wetlands that could be located in the project area include cypress swamp, bayhead swamps, and bottomland pine flatwoods.

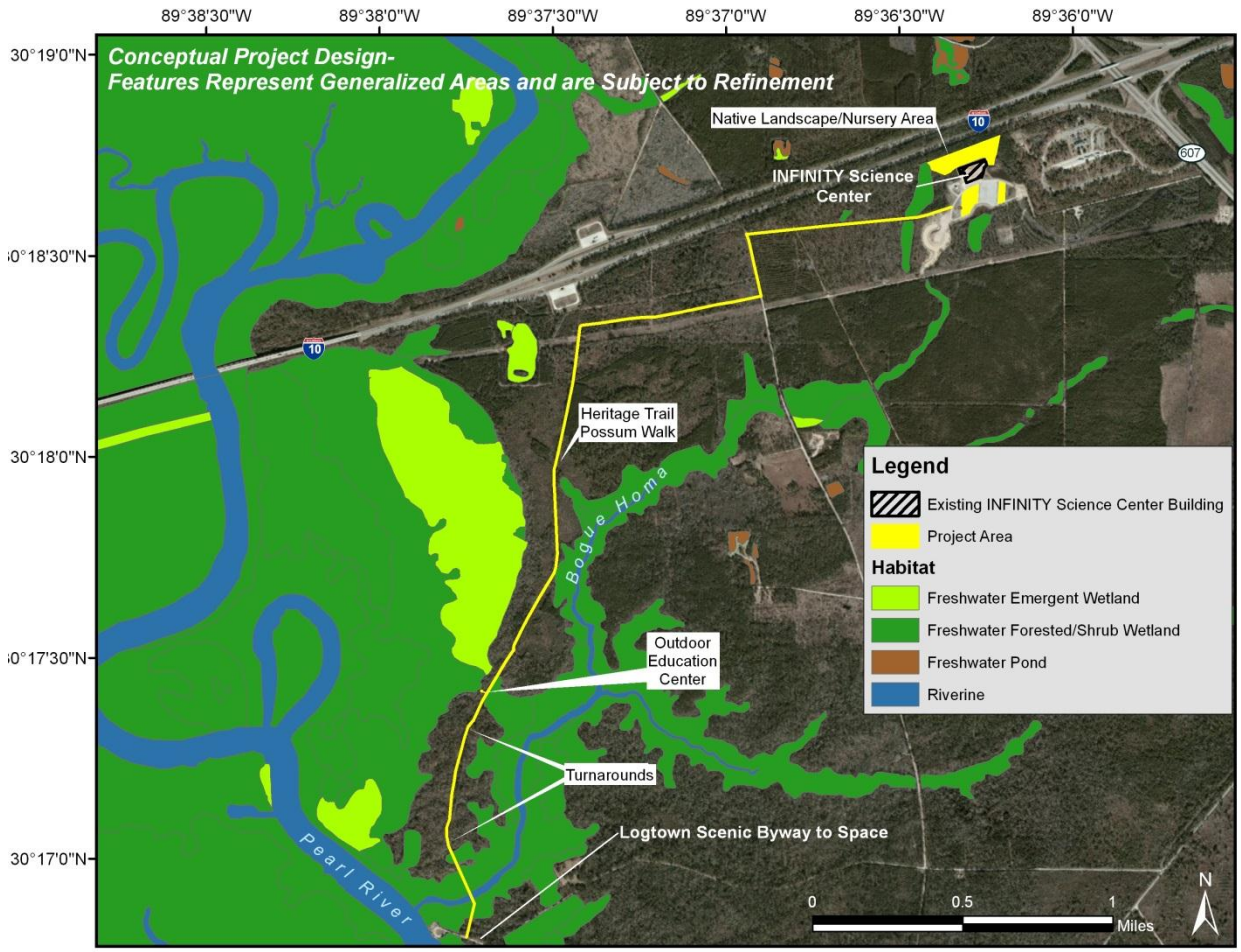

Figure 10-8. Wetlands–Restoration Initiatives at the INFINITY Science Center.

- Cypress swamps are dominated by bald cypress and water tupelo. Cypress swamps are heavily influenced by fire or times of drought. After a fire or drought, which regresses other vegetation, cypress trees reestablish very quickly. A cypress swamp can be inundated with shallow water for an extended period of time.
- Bayhead swamps are located adjacent to creeks and in drainages or depressions in flatwoods. These swamps can be seasonally or semi-permanently flooded. The dominant species include sweet bay magnolia (*Magnolia virginiana*), swamp blackgum (*Nyssa sylvatica*), laurel oak (*Quercus laurifolia*), red maple (*Acer rubrum*), sweetgum (*Liquidambar styraciflua*), water oak (*Quercus nigra*), and bald cypress.
- Pine flatwoods are dominated by loblolly pine (*Pinus taeda*), southern red oak (*Quercus rubra*), and post oak (*Quercus stellata*). They are generally open park-like areas. Low areas within pine flatwoods could contain enough hydrology to be considered a wetland.

Trail users would have a view of the forested wetlands/scrub shrub wetlands on the Pearl River and could traverse the Bogue Houma floodplain on the existing Heritage Trail-Possum Walk boardwalk.

Near INFINITY, there are approximately 3.5 acres of emergent and scrub shrub wetlands between INFINITY and Interstate 10 where the native landscape/nursery area would be constructed. These wetlands were forested at one point and included vegetation typical of a pine flatwood. They have since

been altered as a permitted activity during the construction of INFINITY to increase the viewshed of the facility. The vegetation now consists of cattails, bulrushes, and other vegetation typical of palustrine emergent and scrub shrub wetland in the area. The hydrology for these wetlands is primarily surface water runoff from surrounding topography into the low elevation of the wetlands. The hydrology is also influenced by containment due to road and dummy line railroad embankments. These embankments impound water in an area and prevent the water from spreading out evenly across the landscape.

The Heritage Trail-Possum Walk was recently constructed and consists of crushed limestone placed between railroad timbers. The existing trail extends approximately 3.1 miles from the west side of the INFINITY Science Center to the south near bayhead swamp, cypress swamp, pine flatwoods, and other wetlands as well as forested upland and previously disturbed wetlands. The trail turnaround has been designed to avoid wetlands and would be placed on uplands. However, the boardwalk and Outdoor Education Center are planned in an area that would include cypress swamp.

Environmental Consequences

Hydrology

Grading in the area of the native landscape/nursery area would include small impoundments in the existing wetland area. The site modifications would result in detention of localized runoff in small open water impoundments within the native landscape/nursery area. There would be minor, long-term, adverse impacts to hydrology in the native landscape/nursery area.

The INFINITY Science Center access enhancement would create 4.5 acres of impervious asphalt. Paving would increase the rate of runoff, which is currently routed to an existing 3-acre stormwater basin (Figure 10-8) where it would infiltrate into the ground. The paving of the trail would also result in a slight increase in the rate of runoff by creating approximately 2.6 acres of asphalt-paved trail. This runoff would drain directly to the impervious areas adjacent to the trail. The increased runoff rate would be managed in the vicinity of parking area improvements and throughout the 2.9-mile trail distance and would be a minor modification to current hydrologic patterns. There would be a minor, long-term impact to hydrology in the project area.

Water Quality

Suspended sediment in stormwater runoff would occur as a result of grading in the native landscape/nursery area at least until the area is colonized by vegetation. This would result in a short-term, minor, adverse impact.

The turnaround areas would require grading of approximately 0.02 acre. Sediment transport in stormwater would be a minor, short-term impact, at least until this area is vegetated.

Installation of the boardwalk and Outdoor Education Center would result in short-term, minor turbidity in the cypress swamp. The proposed methodology for installation of the boardwalk would include a helical pier system. This would minimize water quality impacts and would not require traditional or vibratory pile driving. Additionally, BMPs would be implemented to minimize short-term sediment transport and to prevent sedimentation and pollution in wetlands. Best management practices include, but are not limited to, the use of sediment trapping techniques (such as silt fences and barriers), refueling and maintenance of equipment in uplands, and the use of non-creosote materials.

A total of 7.0 acres of grading would result in minor, short-term adverse impacts to water quality. A Construction General Permit would be required as disturbance would exceed 5.0 acre. During operations, stormwater runoff from the paved parking area would drain into the stormwater basin where it would infiltrate into the groundwater. Similarly, runoff from the trail would drain by overland sheet flow. Some runoff would percolate into the soils/pervious areas and some would collect in nearby drainage channels. Impacts from typical contaminants in the roadway runoff would be long term, minor, and adverse.

Other potential water quality impacts could be fluids (oil, gas, lubricant) from construction equipment and vehicles that could leak into the groundwater. A stormwater pollution prevention plan (SWPPP) would be prepared and erosion, sedimentation, and stormwater runoff would be managed in accordance with MDEQ stormwater requirements.

Floodplains

A portion of the Heritage Trail-Possum Walk, trail turnaround, boardwalk, and Outdoor Education Center are located in the 100-year floodplain. Paving of the trail would increase the amount of impervious surface in the area, potentially increasing the rate of stormwater runoff draining to the nearby drainage channels. The project would not appreciably increase flooding in the area.

Wetlands

The following table displays the project elements and the potential USACE authorization required for impacts to wetlands (Table 10-13).

Native Landscape/Nursery Area

This facility would likely impact palustrine emergent wetlands that are dominated by cattails and bulrushes. The project footprint is 6.5 acres. The estimated acreage that would be impacted would be 3.5 acres. These impacts were permitted by the Vicksburg District under General Permit #CELMK-OD-FE 14-GPD-53. Compensatory mitigation would be completed in accordance with 14 C.F.R. 1216.205. The impacts would be long term, minor, and adverse.

Heritage Trail-Possum Walk

Paving of the trail could result in impacts to palustrine emergent, scrub shrub, or forested wetlands. Construction activities could disturb the vegetation adjacent to the trail due to movement of construction equipment; however, the paving would be done over already-constructed trail, so impacts to wetlands would be anticipated but would be avoided to the extent possible. Minimal impacts to bayhead swamp, cypress swamp, and pine flatwoods are possible. Any impacts to wetlands as a result of this project element could require authorization from the USACE. In order to comply with a Section 404 of the Clean Water Act, all of the general conditions for the permit must be met. The conditions include, but are not limited to, guidance and BMPs concerning disrupting aquatic life movement, work within the 100-year floodplain, and sediment and erosion controls.

Table 10-13. Project element wetland considerations—Restoration Initiatives at INFINITY Science Center.

PROJECT FEATURE	HABITAT	PROJECT FOOTPRINT	ESTIMATED WETLAND ACREAGE	USACE AUTHORIZATION
Native Landscape/Nursery Area	Palustrine Emergent Wetlands	6.5 acres	3.5 acres	Authorized by General Permit 53
Heritage Trail-Possum Walk/Trail Turnarounds	Upland/Wetlands	2.9 miles; 2.48 acres	Less than 0.49 acre total and per crossing	Authorization for potential wetland crossings
Boardwalk and Outdoor Education Center	Cypress Swamp	0.05 acre	0.05 acre	for pile placement to support boardwalk and Outdoor Education Center in a wetland setting

Trail Turnaround

Trail pullovers would be placed in uplands as to avoid wetlands. This would be confirmed prior to construction by the acquisition of an approved jurisdictional determination from the USACE.

Boardwalk and Outdoor Education Center

Impacted wetlands would include impacts to palustrine forested wetlands, namely the cypress swamp in the Pearl River floodplain. The project footprint is 0.05 acre. The construction would shade vegetation under the pier and boardwalks, but the shading would be minimized by appropriate material that would allow light penetration to the marsh. In addition, the facility would be located at the interface of the cypress swamp and marsh in the Hancock County Marsh Preserve. There would be some disturbance to vegetation in the immediate area of each feature due to movement of construction equipment. There would be no fragmentation of vegetative communities; therefore, short-term construction impacts and long-term filling impacts would be minor where wetlands are present.

Prior to all construction activities, coordination with USACE would be conducted to determine the extent of the wetlands and potential impacts and to secure authorization for proposed wetland fill and in-water activities. Hancock County is within the Mississippi Coastal Zone. Impacts to wetlands within this zone also require a Mississippi Coastal Wetland Protection Act Permit and coordination with the MDMR. Under the Coastal Zone Management Act of 1972, selected restoration projects must be consistent to the maximum extent practicable with the federally-approved coastal management programs for the states in which the projects are to be conducted. On December 12, 2013, the Federal Trustees submitted a consistency determination to the MDMR for this project for appropriate state reviews coincident with public review of the Phase III DERP/ER. On February 4, 2014, the MDMR responded and concurred with the federal determination for the project for purposes of finalizing this early restoration plan (Miller 2014).

Minor, long-term, adverse impacts to hydrology would be expected. Water quality impacts would be minor and short term. During operation, long-term, minor, adverse water quality impacts would occur as a result of typical roadway runoff. There would be no increase in flooding as a result of projects. There would be minor, short-term and long-term impacts to palustrine emergent, scrub shrub, and forested wetlands, although impacts would be mitigated through appropriate measures. Coordination

with USACE and MDMR would be conducted to determine the wetland impacts and to secure proper authorizations. The general and regional conditions of all USACE and MDMR permits would be adhered to.

10.5.6.4 Air Quality and Greenhouse Gas Emissions

Affected Resources

The U.S. Environmental Protection Agency (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), the EPA has promulgated National Ambient Air Quality Standards (NAAQS). Under the CAA, the EPA establishes primary and secondary air quality standards. Primary air quality standards protect the public health, including the health of "sensitive populations, such as people with asthma, children, and older adults". Secondary air quality standards protect public welfare by promoting ecosystems health, and by preventing decreased visibility, and damage to crops and buildings. The EPA has set NAAQS for the following six criteria pollutants: ozone, particulate matter (PM 2.5 and 10), nitrogen dioxide (NO_2), carbon monoxide (CO), sulfur dioxide (SO_2), and lead.

Air Quality

Mississippi has adopted these federal standards (Table 10-14). According to MDEQ, Hancock County and the entire state of Mississippi are classified as in attainment, meaning criteria air pollutants do not exceed the NAAQS.

Greenhouse Gas Emissions

Greenhouse Gases (GHGs) are chemical compounds found in the earth's atmosphere that absorb and trap infrared radiation as heat. Global atmospheric GHG concentrations are a product of continuous emission (release) and removal (storage) of GHGs over time. In the natural environment, this release and storage is largely cyclical. For instance, through the process of photosynthesis, plants capture atmospheric carbon as they grow and store it in the form of sugars. Human activities such as deforestation, soil disturbance, and burning of fossil fuels disrupt the natural cycle by increasing the GHG emission rate over the storage rate, which results in a net increase of GHGs in the atmosphere. The principal GHGs emitted into the atmosphere through human activities are CO_2, methane, nitrous oxide, and fluorinated gases, such as hydrofluorocarbons, perfluorocarbons, and sulfur hexafluoride (EPA 2012). CO_2 is the major GHG emitted, and the burning of fossil fuels accounts for 81 percent of all U.S. GHG emissions (EPA 2012).

Table 10-14. State and federal ambient standards for criteria air pollutants.

POLLUTANT	AVERAGING PERIOD	STATE AND FEDERAL PRIMARY STANDARD
Ozone	8-hour	0.075 ppm
	1-hour (daily max.)	0.12 ppm
PM2.5	Annual (arithmetic mean)	15.0 $\mu g/m^3$
	24-hour	35 $\mu g/m^3$
PM10	Annual (arithmetic mean)	NA
	24-hour	150 $\mu g/m^3$
Carbon Monoxide	8-hour	9 ppm
	1-hour	35 ppm
Nitrogen Dioxide	Annual (arithmetic mean)	0.053 ppm
	1-hour	0.100 ppm
Sulfur Dioxide	Annual (arithmetic mean)	0.03 ppm
	24-hour	0.14 ppm
	1-hour (per annum)	NA
	1-hour (per 7 days)	NA
	5-minute	NA
Lead	Rolling 3-month average	0.15 $\mu g/m^3$
	Quarterly average	1.5 $\mu g/m^3$
Total Suspended Particulates	Annual (geometric mean)	NA
	24-hour	NA

Environmental Consequences

Air Quality

Project implementation would require the use of heavy equipment, which could temporarily lead to air quality impacts from equipment exhaust. The construction of the proposed project would also cause short-term fugitive dust, although dust would be controlled with water spray to the extent feasible.

The production of asphalt during the paving of the parking lot and Heritage Trail-Possum Walk would release small quantities of various volatile organic compounds (VOC) such as hazardous air pollutants (HAP) and aerosols into the atmosphere. No air quality permits are required for this type of project and violations of state air quality standards are not expected.

Greenhouse Gas Emissions

The use of gasoline- and diesel-powered construction vehicles and equipment, including cars, trucks, trackhoes, paving machines, gators, generators, concrete trucks and other equipment would contribute to an increase in GHG emissions. Table 10-15 details the construction equipment needed to complete the project, the total hours used for each type of equipment, and the emissions resulting from the use of equipment.

Based on the assumptions detailed in Table 10-15, the project would generate approximately 653.22 metric tons of GHGs over the duration of all phases. The following mitigation measures have been identified to reduce or eliminate GHG emissions from the project.

- Shut down idling construction equipment, if feasible.
- Locate staging areas as close to construction sites as practicable to minimize driving distances between staging areas and construction sites.

- Encourage the use of the proper size of equipment for the job to maximize energy efficiency.
- Encourage the use of alternative fuels or power sources for generators at construction sites, such as propane or solar power, or use electrical power where practicable.

Considering projected GHG emissions and the incorporation of mitigation measures, the project would have short-term minor impacts but no long-term impacts on GHGs.

Table 10-15. Greenhouse gas impacts—Restoration Initiatives at INFINITY Science Center.

EQUIPMENT DESCRIPTION	TOTAL HOURS USED	CO_2 FACTOR MT*/100HRS	CO_2 (MT)	CH_4 FACTOR MT/100HRS	CH_4 (MT)	NO_2 FACTOR-MT/100HRS	NO_2 (MT)	TOTAL CO_2 (MT)
Bobcat / Loader (T-300 Series)	1704	2.65	45.16	0.90	15.34	10.60	180.62	241.12
Dump Trucks (tandem)	2119.6	1.70	36.03	0.50	10.60	7.20	152.61	199.24
Concrete Trucks (redi mix)	64	1.70	1.09	0.50	0.32	7.20	4.61	6.02
Pick-Up Truck	904	1.10	9.94	0.35	3.16	4.40	39.78	52.88
Trackhoe (300 series)	78	2.55	1.99	0.85	0.66	10.20	7.96	10.61
Concrete Pump Truck	4	2.55	0.10	0.85	0.03	10.20	0.41	0.54
Moto Grader (H-6 Series)	12	2.25	0.27	0.65	0.08	9	1.08	1.43
Paving Machine	236.8	2	4.74	0.50	1.18	8	18.94	24.86
Smooth Drum Roller	187.2	2	3.74	0.50	0.94	8	14.98	19.66
Multi Tire Roller	20.8	2	0.42	0.50	0.10	8	1.66	2.18
"Gator" 4 wheelers	960	1.35	12.96	0.40	3.84	5.75	55.20	72.00
Georgia Buggies	56	1.35	0.76	0.40	0.22	5.75	3.22	4.20
Generators (small trailer mount)	480	0.85	4.08	0.25	1.20	2.75	13.20	18.48
Total	**6826.4**							**653.22**
*MT = metric tons								

10.5.6.5 Noise

Affected Resources

The Noise Control Act of 1972 (42 U.S.C. 4901 to 4918) was enacted to establish noise control standards and to regulate noise emissions from commercial products such as transportation and construction equipment. The standard measurement unit of noise is the decibel (dB), which represents the acoustical energy present. Noise levels are measured in A-weighted decibels (dBA), a logarithmic scale which approaches the sensitivity of the human ear across the frequency spectrum. A 3-dB increase is equivalent to doubling the sound pressure level, but is barely perceptible to the human ear. Table 10-16 presents some familiar sounds and their decibel levels.

Current noise at the proposed native landscape/nursery and parking lot access improvement sites consists mostly of traffic noise from Interstate 10. Other noise is typical of an interstate rest area. Noise

at the proposed Heritage Trail-Possum Walk paving, trail turnarounds, boardwalk, and Outdoor Education Center is consistent with natural upland and wetland habitat. Receptors to noise consist of visitors to INFINITY and wildlife. There are no residential buildings or other types of human developments in the project area.

Table 10-16. Familiar sounds and their decibel levels (dB).

SOUND	DECIBEL LEVEL (DB)
Whisper	30
Normal Conversation	50 – 65
Vacuum Cleaner at 10 ft.	70
Midtown Manhattan Traffic Noise	70 – 85
Lawnmower	85 – 90
Train	100
Nearby Jet Takeoff	130

Environmental Consequences

Instances of increased noise are expected during construction due to the use of construction equipment. Adverse construction noise impacts would be short term, and minor.

Noise from operations at the INFINITY Science Center, including parking, would be consistent with current noise levels. Additional noise impacts after construction would result from increased use of the Heritage Trail-Possum Walk, boardwalk, and Outdoor Education Center including vehicular (mostly golf cart) traffic on the trails. The noise would be generated during daytime hours and is not expected to alter the activities of fauna that utilize the area. Additional noise would be caused by maintenance activities. Appropriate BMPs would be employed to prevent, mitigate, and control potential impacts from noise.

There would be only short-term, minor adverse noise impacts during construction. Long-term, minor, noise impacts to wildlife from additional visitors along the Heritage Trail-Possum Walk and at the Outdoor Education Center would be minor as well.

10.5.6.6 Biological Environment

Living Coastal and Marine Resources

Flora

Affected Resources

The vegetative communities of the native landscaping/nursery area include typical vegetation found in palustrine emergent wetland habitat and maintained landscape in Hancock County. The vegetation includes a mix of cattails and bulrushes in the wetland habitat. The adjacent vicinity of these project areas is generally maintained by mowing and other standard landscaping practices. The vegetation directly surrounding the parking lot area consists of mowed lawn.

The vegetative communities of the Heritage Trail-Possum Walk improvements, trail turnaround, boardwalk, and Outdoor Education Center are typical for the region and include upland habitat and

freshwater emergent, forested and scrub shrub wetlands. These project elements are located in areas characterized by pine and mixed bottomland hardwood species. The dominant species found in bottomland hardwood communities are oaks, black gum, swamp tupelo, and pond cypress. The understory includes ash species, black willow, red maple, poison ivy, honeysuckle, and grapes. Very few grass or forbs (herbs other than grass) species occur in these communities (NASA 2006).

Environmental Consequences

There would be limited adverse impacts to vegetation as a result of the native landscaping/nursery area, parking lot paving, or Heritage Trail-Possum Walk improvements since the clearing for the majority of these areas has already been completed.

The trail turnaround, boardwalk, and Outdoor Education Center would require some clearing and grubbing of existing vegetation. The areas of bottomland vegetation affected from clearing and grubbing would be approximately 0.02 acre for the trail turnaround, 0.01 acre for the boardwalk, and 0.4 acre for the Outdoor Education Center. Best management practices would be implemented, as appropriate, and would include, but would not be limited to, removing the minimum amount of vegetation necessary, using well-maintained tools to prevent damage when pruning adjacent or overhanging vegetation and reducing soil compaction that would prevent regrowth of vegetation by minimizing the amount of heavy equipment.

Adverse impacts to vegetation from clearing and grubbing would be long term and minor for the trail turnaround, boardwalk, and Outdoor Education Center project elements. Impacts to wetlands were addressed in Section 3.1.2.

Invasive Species

Affected Resources

The potential introduction of terrestrial and aquatic non-native invasive species of plants, animals, and microbes is a concern for any proposed project. Non-native invasive species could alter existing terrestrial or aquatic ecosystems, may cause economic damages and losses, and are frequently the second most common reason for protecting species under the Endangered Species Act. The species that are or may become introduced, established, and invasive are difficult to identify. The analysis focuses on pathway control or actions/mechanisms that may be taken or implemented to prevent the spread of invasive species on site or introduction of species to the site.

Surveys have not been conducted to determine if invasive species are present. The project area, throughout its history, has been modified by fill, recreational use, and other manmade disturbances. Invasive species, to some degree, may be present.

Environmental Consequences

BMPs to prevent the spread of invasive species through common pathways will be implemented thereby minimizing the potential for short and long-term adverse impacts from the proposed project. The implementation of these BMPs meets the spirit and intent of EO 13112. This project involves the construction of an Outdoor Education Center, trail paving, parking lot paving, and grading in a native landscape/nursery area. A variety of terrestrial construction equipment would be used. Each of these actions and pieces of equipment serve as a potential pathway to introduce or spread invasive species.

To ensure these pathways are "broken" and do not spread or introduce species the following BMPs will be implemented: all equipment to be used during the project, including personal gear, will be inspected and cleaned such that there is no observable presence of mud, seeds, vegetation, insects, and other species. Native vegetation will be used for planting. Prior to bringing vegetation to the project site, vegetation will be inspected and "non-target[6]" species would be removed. Due to the implementation of BMPs, the Trustees expect risk from invasive species introduction and spread to be short term and minor.

Fauna

Affected Resources

The project area consists of habitat suitable for deer, turkey, and quail in the woodlands and various songbirds in the open areas such as grasslands, forest edges, and mowed lawns. The area is partially located adjacent to Interstate 10, which fragments existing habitats and creates noise and hazards to wildlife.

The *John C. Stennis Space Center Environmental Resources Document* (NASA 2012) was used to extrapolate fauna that could be present on the project site. The NASA 2012 report includes an area approximately three miles to the north of the project.

North of the project area, a total of 25 amphibian species utilize poorly drained lowlands with a vegetative cover of pine and mixed hardwood and could be found within the project area. Typical amphibians include frogs, toads, salamanders, and sirens. A total of 33 terrestrial and aquatic reptiles were documented in the NASA 2012 report. These included 14 species of snakes, six of lizards, and the alligator. A total of 25 mammals were documented in the NASA 2012 report. Thirty-five species of mammals including one bat were documented. Mammal species that are likely to occur at SSC, but were not documented in the NASA 2012 report, include shrews, bats, flying squirrels, mice, voles, rats, foxes, weasels, and minks. Habitat is limited in the area of project activities which includes a relatively disturbed area between Interstate 10 and the INFINITY Science Center, a parking lot, the Heritage Trail-Possum Walk (which is a cleared corridor through bottomland hardwoods), and a small area of impact in a cypress swamp.

Environmental Consequences

The project elements at INFINITY would disturb upland and bottomland areas utilized by an estimated 214 species including mammals, birds, reptiles, and amphibians.

The native landscape/nursery area would disturb palustrine emergent wetlands and mowed areas and the aquatic species that utilize those areas, but would be replaced by similar habitat; thus, the adverse impacts would be short term and minor.

The access improvements/paving of the parking lot area would result in short-term, minor, adverse impacts due to construction equipment noise potentially disturbing local fauna.

Most of the proposed trail paving would take place over the existing trail. However, a small amount of habitat on either side of the existing trail could potentially be disturbed. The construction of the trail

[6] A non-target species is any species that is present on the species of choice but is not desirable and should be removed.

turnaround, boardwalk, and Outdoor Education Center would be a minor disturbance to cypress/tupelo swamp and minor grading within forested upland. No tree removal is anticipated. This may cause temporary displacement of common wildlife such as deer, turkey, and quail into adjacent wooded areas.

There would be short-term, minor, adverse impacts to all species of fauna as a result of habitat intrusion and disturbance during construction of all project elements. The species are expected to avoid construction activities and return once construction activities cease. Long-term impacts to wildlife habitat from the additional presence of visitors along the Heritage Trail-Possum Walk and at the Outdoor Education Center would be considered minor.

Protected Species

Affected Resources

The U.S. Fish and Wildlife Service (USFWS) lists species as threatened or endangered when they meet criteria detailed under the Endangered Species Act (ESA) of 1973, as amended (16 U.S.C. §1531 et seq.). Additionally, Mississippi Wildlife Fisheries and Parks (MWFP) identify and list protected species. Section 7(a)(2) of the ESA requires that each federal agency ensure that any action authorized, funded, or carried out by the agency is not likely to jeopardize the continued existence of any endangered or threatened species or result in the destruction or adverse modification of critical habitat of those species. MBTA compliance and BGEPA compliance are discussed in this section.

Federally protected species that are known to occur or could occur in Hancock County are discussed in this section and are detailed in Table 10-17. However, only Louisiana quillwort, Louisiana black bear, black pine snake, and gopher tortoise have the potential to occur in the project area.

Table 10-17. Threatened, endangered, and candidate species in Hancock County, Mississippi.

COMMON NAME	SCIENTIFIC NAME	FEDERAL STATUS	STATE STATUS	HABITAT
Birds				
Piping Plover	*Charadrius melodus*	Threatened	Endangered	Beaches and mudflats in southeastern coastal areas
Red Knot	*Calidris canutus rufa*	Proposed	--	Marine intertidal habitats including inlets, estuaries, and bays feeding in mud and sand flats on beaches and barrier islands
Ferns and Allies				
Louisiana Quillwort	*Isoetes louisianensis*	Endangered	--	Aquatic or wet habitats, mostly shallow streams in bottomland habitats (MDWFP 2001; HCBS 2012)
Mollusks				
Inflated Heelsplitter	*Potamilus inflatus*	Threatened	Endangered	Riverine, Lower Pearl River, Noxubee, and Tombigbee watersheds in areas with moderate to swift currents, riffle/shoals areas with stable bottoms of sandy gravel or firm mud, gravel, and cobble
Fishes				
Gulf Sturgeon	*Acipenser oxyrinchus desotoi*	Threatened	Endangered	Migrates from large freshwater coastal rivers to brackish and marine coastal bays and estuaries
Pearl Darter	*Percina aurora*	Candidate	Endangered	Rapids or riffles over gravel or bedrock substrata in slow to moderate currents (MDFWP 2001)
Mammals				
West Indian Manatee	*Trichechus manatus*	Endangered	Endangered	Fresh and salt water in large coastal rivers, bays, bayous and estuaries
Louisiana Black Bear	*Ursus americanus luteolus*	Threatened	Endangered	Bottomland hardwood forest; dispersal corridors
Reptiles				
Hawksbill Sea Turtle	*Eretmochelys imbricate*	Endangered	Endangered	Coral reefs, open ocean, bays, estuaries
Leatherback Sea Turtle	*Dermochelys coriacea*	Endangered	Endangered	Open ocean, coastal waters
Kemp's Ridley Sea Turtle	*Lepidochelys kempii*	Endangered	Endangered	Nearshore and inshore coastal waters, often in salt marshes; neritic zones with muddy or sandy substrate (NOAA Fisheries 2013)
Green Sea Turtle	*Chelonia mydas*	Threatened	Endangered	Shallow coastal waters with SAV and algae, nests on open beaches
Loggerhead Sea Turtle	*Caretta caretta*	Threatened	Endangered	Open ocean; also inshore areas, bays, salt marshes, ship channels and mouths of large rivers
Ringed Map Turtle	*Graptemys oculifera*	Threatened	Endangered	Riverine, river stretches with moderate currents, abundant basking sites, and sand bars for nesting (MDWFP 2001; USFWS 2010)
Gopher Tortoise	*Gopherus Polyphemus*	Threatened	Endangered	Open canopy longleaf pine/scrub oak habitats with well-drained sandy soils and ground cover (USFWS 2010; HCBS 2012)
Black Pine Snake	Pituophis melanoleucus lodingi	Candidate	Endangered	Open canopy longleaf pine/hardwood habitats with well-drained sandy soils and ground cover (MDWFP 2001; USFWS 2010)

Ferns and Allies

Louisiana Quillwort (*Isoetes louisianensis*): The Louisiana quillwort has been observed in 10 counties in 174 streams within 17 watersheds (USFWS 2012) throughout the state of Mississippi with the largest colony found in the DeSoto National Forest (USFWS 2012). This species is found in all three coastal Mississippi counties including Hancock County (MDWFP 2001; HCBS 2012; USFWS 2012) although none have been found near the proposed project area (MDWFP 2001). In coastal Mississippi, Louisiana quillwort habitat includes perennial streams and banks in bottomland hardwood habitats likely with bald cypress and possibly the presence of stream macrophytes such as *Sparganium* spp. and *Orontium* spp. (USFWS 2012). Earlier sources indicate that suitable habitat for this species consists of sand or gravel bars located in intermittent streams and associated riparian areas (MDWFP 2001; HCBS 2012). Louisiana quillwort is sensitive to changes in hydrology, sedimentation, and alterations to the surrounding overstory (USFWS 2010).

In 2012, a visual survey was performed within 50 ft. of the existing Heritage Trail-Possum Walk (HCBS 2012). This survey found no occurrence of the Louisiana quillwort. Suitable habitat was found for the species in areas adjacent to the survey area, although the location and details of this habitat were not reported (HCBS 2012). The footprint for construction of the Outdoor Education Center, turnarounds and paving of the existing Heritage Trail-Possum Walk does not include the Bogue Homa, which is the closest stream. The proposed locations for the trail and Outdoor Education Center are located in an area that contains cypress swamp and some standing water. Additionally, as reported in the General Permit 53 (CELMK-OD-FE14-GPD; September 25, 2012), 2010 and 2012 surveys within the footprint of the native landscaping/nursery did not report any Louisiana quillwort.

Mammals

Louisiana Black Bear (*Ursus americana luteolus*): The Mississippi Department of Wildlife, Fisheries, and Parks (MDWFP) estimates the Mississippi population of Louisiana black bear to be around 50 animals. Most of the bears observed in Mississippi are believed to be males that have traveled from other states; only one was reported sighted in Hancock County from 1996 – 2006 (Young 2006). This sighting was in northern Hancock County in the Pearl River drainage system. Large contiguous bottomland forest habitat is preferred by the species and does exist adjacent to the proposed project elements. However, the bears typically prefer larger tracts of bottomland forest with no human disturbance and having good cover (Young 2006). The proposed project areas do not have hardwood forest that is preferred by Louisiana black bear. Surveys in the area north of the existing INFINITY building and around the existing Heritage Trail-Possum Walk resulted in no observations of Louisiana black bears (HCBS 2012). There is no known breeding population of bears in this area, and any presence would likely be transitory animals following the river corridor for foraging and cover.

Reptiles

Black Pine Snake (*Pituophis melanoleucus lodingi*): Although the black pine snake range includes several Mississippi counties, there are no recent published reports of the species in Hancock County (MDWFP 2001; HCBS 2012). Studies have determined that black pine snake populations have decreased from historic levels; in Mississippi the species is most common in the DeSoto National Forest, to the north of the proposed project area (MDWFP 2001). Suitable habitat includes open canopy longleaf pine forest with herbaceous ground cover and well-drained sandy soils and, less so, hardwood forests

(USFWS 2010). Much of the habitat in the proposed project area is not suitable because of dense canopy cover or due to existing disturbance (HCBS 2012).

Gopher Tortoise (*Gopherus polyphemus*): The gopher tortoise uses similar habitat to the black pine snake. In 2012, a survey was performed for this species throughout all uplands within 20 ft. of the existing Heritage Trail-Possum Walk (HCBS 2012). This survey found no occurrence of the gopher tortoise or burrows. The habitat in the survey area was deemed unsuitable for gopher tortoises due to the dominance of dense tree and shrub cover and a minimal herbaceous layer.

Environmental Consequences

The Louisiana quillwort, Louisiana black bear, black pine snake, and gopher tortoise have the potential to occur in the project area and are discussed below.

Louisiana Quillwort (*Isoetes louisianensis*): Recent surveys found no occurrences of the Louisiana quillwort and no streams are found within the construction footprint; therefore, it is unlikely that implementation of the project would impact this species.

Louisiana Black Bear (*Ursus americana luteolus*): There would be no expected impacts to Louisiana black bear because the proposed construction activities would occur in project areas that do not have the large contiguous hardwood forest preferred by Louisiana black bear. The project is not expected to impact any migratory movement or foraging of the species.

Black Pine Snake (*Pituophis melanoleucus lodingi*): There would be no expected impacts to black pine snake because of lack of suitable habitat within the project area.

Gopher Tortoise (*Gopherus polyphemus*): Because of the lack of suitable habitat within the proposed project area for the gopher tortoise, no impacts are expected during project construction.

Findings: ESA Section 7 consultations (McClain 2014) were completed with USFWS on January 24, 2014.The USFWS concurred that the project, as proposed, may affect, but is not likely to adversely affect the Louisiana black bear (*Ursus americanus pallas)* and no effects would occur to other listed, proposed, or candidate species considered. The Trustees intend to implement measures that are required by the USFWS and NMFS and would consider additional practices that may emerge from additional regulatory consultations. These measures resulting from the consultations include:

- Measures to protect Gulf Sturgeon. No in-water work will occur in Gulf Sturgeon critical habitat in the Pearl River. All available construction best management practices will be used to prevent and control any runoff to ensure none reaches the Pearl River.
- Measures to protect Louisiana black bear. All workers will be informed of the potential for Louisiana black bear presence. If this species uses the project area it will likely be transitory in nature and likely will occur to the west of the proposed project area within the river corridor. If any bears are found to be present in the immediate project area during project activities, construction will be halted until the species move away from the project area. Construction best management practices (i.e. minimize noise and habitat disturbance) will be used to avoid or minimize any impacts during construction.

Migratory Birds

Affected Resources

A total of 142 bird species were documented in the vicinity of the INFINITY projects (NASA 2012). The waters and surrounding wetlands of the project area are part of the Mississippi Flyway, which would bring numerous species of migratory birds including waterfowl and shorebirds through the area. The upland areas as well as the wetlands scattered throughout the project area such as estuarine marsh, emergent/scrub shrub, shoreline emergent, and shallow open waters could support various species of migrating birds for refuge, feeding, or wintering. Migratory bird guilds that could have presence in the INFINITY project area include wading birds, waterfowl, raptors, rails and coots, landbirds, and doves and pigeons (see Table 10-18).

Table 10-18. Migratory bird guilds anticipated in the Restoration Initiatives at INFINITY Science Center project area.

SPECIES	BEHAVIOR	SPECIES/HABITAT IMPACTS
Wading birds (herons, egrets, ibises)	Foraging, feeding, resting, roosting	Wading birds primarily forage and feed at the water's edge. The project would not disturb any open water area. It is expected that they would be able to move to another nearby location to continue foraging, feeding and resting if they are affected by construction activities. These birds primarily roost in trees or shrubs (e.g. pines, *Baccharis*). The construction of the boardwalk and Outdoor Education Center would occur in cypress tupelo swamp. Trees would be avoided to the extent possible during construction.
Waterfowl (ducks, loons, and grebes)	Foraging, feeding, resting, roosting,	Waterfowl may forage, feed, rest, and roost in the project area. As such, they may be impacted locally and temporarily by the project. It is expected that they would be able to move to another nearby location to continue foraging, feeding and resting. These birds primarily roost and nest in low vegetation.
Raptors (osprey, hawks, owls)	Foraging, feeding, resting, roosting	Raptors forage, feed, and rest in the project area. As such, they may be impacted locally and temporarily by the project. It is expected that they would be able to move to another nearby location to continue foraging, feeding and resting. Most raptors are aerial foragers and soar long distances in search of food. Locations where these birds roost and nest could be in the project area.
Rails and Coots	Foraging, feeding, resting, roosting,	Rails and coots forage, feed, rest, or roost in the project area. As such, they may be impacted locally and temporarily by the project. However, they are most likely to favor marshy areas. It is expected that they would be able to move to another nearby location to continue foraging, feeding and resting if disturbed by the project. These birds primarily roost and nest in marshes, which are in and near the project area.
Landbirds (white-eyed vireo, great crested flycatcher, indigo bunting)	Breeding, foraging, feeding, roosting	Various species of migratory birds in Mississippi use upland and freshwater wetland habitats including disturbed and human influenced areas. Breeding locations for these species could include open areas, open deciduous woodlands, shrub thickets, and forest edges especially near freshwater wetlands and waterbodies. The project area includes open disturbed areas with trees, grasses, shrubs, and other low vegetation as well as freshwater wetland depressions. Project activities would impact these types of habitat.
Doves and Pigeons	Foraging, feeding, roosting, resting	These species may use the upland habitat where trees and shrubs are available. It is expected that they would be able to move to another nearby location to continue foraging, feeding and resting.

Bald and Golden Eagle Protection Act

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

Environmental Consequences

The Trustee has reviewed the project site and determined that migratory bird nesting is not known and is possible. The MBTA requires the protection of all migratory bird species and protection of ecosystems of special importance to migratory birds against detrimental alteration, pollution, and other environmental degradation. Coordination under MBTA with the USFWS was completed on January 24, 2014. Due to the implementation of BMPs, no “take” is anticipated. Measures to avoid take are described below and no take under the ESA, MBTA or BGEPA is anticipated.

Pre-construction nesting surveys would be conducted and, if evidence of nesting is found, coordination with the USFWS would be initiated to develop and implement appropriate conservation measures.

Bald and Golden Eagle Protection Act

There are no golden eagles in the project area. No bald or golden eagles are known to nest within 660 ft. of the project area. Thus, no impacts to golden or bald eagles are anticipated. Coordination under BGEPA by the USFWS was completed on January 24, 2014. Due to the lack of nest near the project area, no “take” is anticipated.

10.5.6.7 Human Uses and Socioeconomics

Socioeconomics and Environmental Justice

Affected Resources

Socioeconomic resources combine the social resources and economic resources of the area. The social resources evaluation includes consideration such as potential changes in neighborhoods or community cohesion; affordable housing; changes in travel patterns and accessibility; impacts on community facilities; impacts on traffic safety/public safety; and impacts on any special groups such as elderly, handicapped, minority, and transit-dependent persons. The data in this section was compiled using the Census and American Factfinder websites (U.S. Census Bureau 2011 and 2012).

The population of Hancock County in year 2010 was 43,322 (Table 10-19). The project area is contained within Census Tract 304 in Hancock County with a population of 2,313.

Table 10-19. Populations of Mississippi, Hancock County, and Census Tract 304.

TOPIC	MISSISSIPPI		HANCOCK COUNTY		CENSUS TRACT 304	
2010 Total Population	**2,967,297**		**43,322**		**2,313**	
White alone	1,767,875	59.1%	38,564	88.4%	1,876	81.1%
Black or African American alone	1,094,596	37.0%	3,047	7.1%	348	15.0%
Native (American Indian, Alaska Native, Native Hawaiian. and Other Pacific Islander alone)	14,354	0.5%	177	0.5%	10	0.4%
Asian alone	25,807	0.9%	467	1.0%	12	0.5%
Some Other Race alone	22,642	1.3%	238	0.8%	14	0.6%
Two or More Races	31,426	1.1%	829	2.1%	53	2.3%

Table 10-20 lists employment information for Hancock County and County Census Tract 304. The top five industries in Hancock County in terms of employment are educational services, health care and social assistance (15.1 percent); construction (15.0 percent); arts, entertainment, and recreation, and accommodation and food services (13.3 percent); finance and insurance, and real estate and rental and leasing (9.4 percent); and professional, scientific, and management, and administrative and waste management services (9.0 percent). The percentage of unemployed is approximately 7.6 percent of the Hancock County citizens in the civilian labor force. The median household income is $42,591 and the per capita income is $22,596. The nearest medical facility in Hancock County is the Hancock Medical Center, located approximately 15.5 miles southwest of INFINITY. Bayside Fire Department is the closest fire department to INFINITY, and is located approximately 10 miles to the east.

Table 10-20. Selected economic characteristics of Hancock County and Census Tract 304.

	HANCOCK COUNTY	CENSUS TRACT 304, HANCOCK COUNTY
Civilian employed population 16 years and over	**17,265**	**692**
Agriculture, forestry, fishing and hunting, and mining	85 (0.5%)	0 (0%)
Construction	2,588 (15.0%)	121 (17.5%)
Manufacturing	1,238 (7.2%)	83 (12.0%)
Wholesale trade	314 (1.8%)	11 (1.6%)
Retail trade	1,400 (8.1%)	128 (18.5%)
Transportation and warehousing, and utilities	1,118 (6.5%)	43 (6.2%)
Information	63 (0.4%)	0 (0.0%)
Finance and insurance, and real estate and rental and leasing	1,619 (9.4%)	29 (4.2%)
Professional, scientific, and management, and administrative and waste management services	1,556 (9.0%)	3 (0.4%)
Educational services, and health care and social assistance	2,603 (15.1%)	155 (22.4%)
Arts, entertainment, and recreation, and accommodation and food services	2,295 (13.3%)	69 (10%)
Other services, except public administration	1,128 (6.5%)	28 (4.0%)
Public administration	1,258 (7.3%)	22 (3.2%)
% unemployed, civilian labor force	7.6%	11.2%
Median household income (dollars)	$42,591	$38,517
Per capita income (dollars)	$22,596	$18,445
Percentage of all people whose income in the past 12 months is below the poverty line	18.8%	9.7%

Environmental Consequences

There would be no anticipated adverse social, economic, health, or environmental impacts to local communities due to this project. The nearby communities would benefit by additional recreational and educational activities at INFINITY. In addition, there could be short-term and long-term benefits from this project due to temporary employment for local residents and businesses for the construction of the project. Long term, the expected increase in visitors to INFINITY would have benefits to some businesses such as lodging and restaurants in the greater vicinity of the project area.

Environmental Justice

The project is located adjacent to Highway 607 and Interstate 10 and is not adjacent to residential development. The project would not have disproportionately adverse impacts on minority or low-income populations.

10.5.6.8 Cultural Resources

Affected Resources

Cultural resources include historic properties listed in, or eligible for, listing in the National Register of Historic Places (36 C.F.R. §60[a-d]). The NHPA of 1966, as amended (16 U.S.C. §470[f]), defines an historic property as "any prehistoric or historic district, site, building, structure, or object included in, or eligible for inclusion on the National Register [of Historic Places]." This includes significant properties of traditional religious and/or cultural importance to Indian tribes. Historic properties include built resources (bridges, buildings, piers, etc.), archaeological sites, and Traditional Cultural Properties, which are significant for their association with practices or beliefs of a living community that are both fundamental to that community's history and a piece of the community's cultural identity. Although often associated with Native American traditions, such properties also may be important for their significance to ethnic groups or communities.

This project is currently being reviewed under Section 106 of the NHPA to identify any historic properties located within the project area and to evaluate whether the project would affect any historic properties. A Phase I cultural resource survey has been completed for the project site (R. Christopher Goodwin and Associates, 2014). A review of previously conducted cultural resource surveys and previously recorded archaeological sites was completed using the Mississippi Department of Archives and History (MDAH) data. There are four sites within one mile of the proposed project including a ceramic scatter, a shell midden, lithic scatter, and the Logtown linear corridor, which is currently the site of the Heritage Trail-Possum Walk. There were no historic resources identified in the Phase I cultural resource survey, that are eligible for listing on the National Register of Historic Places. The Phase I recommended no further study of the project area (R. Christopher Goodwin & Associates, 2014).

Environmental Consequences

The Logtown linear corridor has recently been evaluated and has been determined ineligible for listing on the National Register of Historic Places. A newly constructed 7-ft.-wide trail is centered in the corridor. Early restoration funds would be used to pave the trail, install turnarounds and pullovers, and to construct an Outdoor Education Center in the Logtown linear corridor. The National Historic Preservation Act of 1966 (NHPA) charges the federal government with considering the potential effects of its actions on the nation's cultural and historic resources. A complete review of this project under Section 106 of the NHPA is ongoing and would be completed prior to any project activities that would

restrict consideration of measures to avoid, minimize or mitigate any adverse effects on historic properties located within the project area. This project would be implemented in accordance with all applicable laws and regulations concerning the protection of cultural and historic resources.

10.5.6.9 Infrastructure

Affected Resources

The proposed project area is partially developed. Existing infrastructure includes roads, parks, trails, and INFINITY. Interstate 10 and Highway 607 serve the Mississippi Welcome Center area, located approximately 0.1 mile to the east of INFINITY. Highway 607 connects with U.S. Highway 90 approximately 6 miles southeast of the proposed site (NASA 2006).

Environmental Consequences

Underground utilities would be located prior to any construction activities. The project would not alter average traffic patterns. There would be no impacts to infrastructure anticipated for this project.

10.5.6.10 Land and Marine Management

Affected Resources

Surrounding land uses include mostly rural, undeveloped areas within the Stennis Space Center (SSC) buffer zone. The Mississippi Welcome Center area and INFINITY, as well as Interstate 10 and Highway 607, are the main developments and land uses of the immediate area. Pearlington is the closest residential neighborhood, located approximately 2.5 miles to the south of the project area. The perpetual restrictive easement of the SSC buffer zone prohibits any “maintenance or construction of dwellings and other buildings suitable for human habitation” (NASA 2012). Land uses within the buffer zone include wildlife management and nature preserve areas, mining (sand, gravel, clay), forestry and livestock operations, and recreation.

The northern extent of the Hancock County Marsh Preserve is located within the project area; it spans land from the Pearl River east to the Bogue Homa Creek and beyond (Figure 10-2). The Heritage Trail-Possum Walk intersects this preserve on the eastern side. It is designated as a Mississippi Coastal Preserve by the MDMR Gulf Ecological Management Site program. Lands within this Coastal Preserve are either privately, locally, state or federally owned. Much of the property is considered tidal wetlands and is already owned by the state (MDMR 2013). The 1972 Coastal Zone Management Act (CZMA), which provides for management of the nation's coastal resources and balances economic development with environmental conservation, governs the nature of land use development of the Hancock County Marsh. The overall program objectives of CZMA remain balanced to "preserve, protect, develop, and where possible, to restore or enhance the resources of the nation's coastal zone.” The MDMR typically issues coastal zone consistency as part of the Mississippi Wetland Protection Act permit process.

Environmental Consequences

Implementation of the project would not disrupt existing land use within the SSC buffer zone. The only restriction within this zone is human habitation and none is proposed for the project. Recreation is one of the existing land uses within the buffer zone and the INFINITY project area and implementation would enhance the recreational land use of the area. Implementation of the project would also not disrupt the land use of the Hancock County Marsh Preserve. The uses of land within Coastal Preserves are meant to both conserve coastal habitats as well as provide compatible human uses. The improvements to the

Heritage Trail-Possum Walk would enhance access to recreation within, and appreciation of, coastal wetlands and uplands. Therefore, there would be long-term beneficial impacts on land use within the Hancock County Marsh Preserve due to project implementation.

Construction of the Heritage Trail-Possum Walk, trail turnaround, boardwalk, and Outdoor Education Center would have long-term beneficial impacts, and is consistent with land management plans in the project area. 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.

10.5.6.11 Aesthetics and Visual Resources

Affected Resources

The landscape in the vicinity of INFINITY consists of maintained landscape around the perimeter of the INFINITY Science Center. Between Interstate 10 and the INFINITY Science Center, the landscape is emergent wetland vegetation and remnant dummy line rail beds. The areas adjacent to the Heritage Trail-Possum Walk consist of upland pine forests, bottomland hardwoods, and freshwater wetlands. The trail system provides visitors with access to nature viewing in these areas. There are no designated protected viewsheds or historic resources in the vicinity of either of the project element areas.

Part of the viewshed of the southern portion of the proposed paving of the Heritage Trail-Possum Walk includes connection to the state of Mississippi designated scenic byway, the Logtown Scenic Byway to Space. This byway showcases scenic and historic resources such as the former Logtown settlement, the historic Logtown cemetery, and natural coastal and riverine habitats and environments. Project improvements would connect the lower Heritage Trail-Possum Walk south of the Bogue Houma to the Logtown Scenic Byway to Space.

Environmental Consequences

During construction, the presence of construction equipment in the project area would adversely affect the viewshed at the project element areas.

After construction is complete, the native landscape/nursery area would provide visitors another area for nature viewing. The paved Heritage Trail-Possum Walk would provide visitors easier access to nature viewing areas and would allow for a connection between the INFINITY Science Center facility and the existing Logtown Scenic Byway to Space. The boardwalk and Outdoor Education Center would expand upon current nature viewing areas.

The improvements to the Heritage Trail-Possum Walk would minimally change the viewshed of the trail from the Logtown Scenic Byway to Space. The surface of the trail would change from a more natural dirt trail to an asphalt-covered trail. However, the context of the trail and the landscape surrounding the trail would not change. The intrinsic scenic, natural, recreational, historical, and cultural qualities of the scenic byway, as well as user enjoyment and promotion of recreational and tourist opportunities of the scenic byway, would not be adversely affected, and in fact, would be enhanced through project implementation.

There would be short-term, minor, adverse aesthetic and visual impacts for visitors during construction of the project elements, but there would be long-term benefits by the creation of new nature viewing areas and increased accessibility.

10.5.6.12 Tourism and Recreational Use

Currently, INFINITY is a tourist attraction and houses a space gallery, an immersive theatre, educational exhibits, and rocket science activities at the nearby space center. New exhibits would be installed with Early Restoration funding. NASA (2012) predicts that the project would create a positive economic and educational impact on the Mississippi Gulf Coast (NASA 2012).

Environmental Consequences

During construction of the native landscape/nursery area, INFINITY Science Center access improvements, Heritage Trail-Possum Walk access improvements, trail turnaround, boardwalk, and Outdoor Education Center, some visitors' experience may be affected slightly by construction equipment and disturbed vegetation (noise and visual adverse consequences). In the long term, the project would have a beneficial impact as a result of the more extensive visitor experience (due to the new facility exhibits and increased access) than what is presently available.

Project impacts from increased visitor use could include littering and noise from individuals and school classes utilizing the Heritage Trail-Possum Walk, the Outdoor Education Center, and the Native Landscape Nursery Area. The impacts will be sporadic, minor and short-term in nature. INFINITY Science Center will be responsible for monitoring litter accumulation, litter removal and maintenance Heritage Trail Possum Walk, the Outdoor Education Center, and the Native Landscape Nursery Area.

Findings: Construction and increased visitor use activities would cause short-term, minor impacts. However, the project would have long-term benefits to tourism and recreational use.

10.5.6.13 Public Health and Safety

Affected Resources

INFINITY currently generates solid waste from facility operations and maintenance. The solid waste generated would consist of household-type wastes.

INFINITY adheres to Occupational Safety and Health Administration (OSHA) standards for protection of employees onsite. INFINITY also adheres to the SSC Safety and Health Procedures and Guidelines, which details specific emergency procedures for responding to natural and human-generated emergencies.

Environmental Consequences

Increases in solid waste as a result of expected growth would be addressed by appropriate waste collection and maintenance activities. NASA is committed to pollution prevention, including recycling and reuse activities, to achieve waste minimization goals. Recycling collection areas would be established for paper, cardboard, aluminum cans and plastic bottles, as appropriate.

There are no anticipated adverse impacts to public health and safety due to construction or operation of the project. The increased access to the Heritage Trail-Possum Walk would provide visitors an area for exercise.

No impacts to public health are anticipated.

10.5.7 Summary and Next Steps

The project is intended to restore lost recreational use by providing increased access to coastal estuarine habitats, wildlife viewing areas, and educational features. The project would enhance and expand a state-of-the-art interactive science, education, interpretive, and research center for use by visitors seeking to experience and learn about the coastal natural resources of the Gulf of Mexico. The project also would serve as a launching point for a comprehensive scenic byway trail system that can take visitors to beaches and tidal coastal estuarine environments.

NEPA analysis of the environmental consequences suggests that while there may be minor adverse impacts to some resource categories, there would be no long-term moderate to major adverse impacts as a result of the project. The project would provide long-term benefits by providing enhanced access to coastal resources and educational opportunities via the Heritage Trail-Possum Walk/Outdoor Education Center and state-of-the-art exhibits at the INFINITY Science Center. The Trustees have completed coordination and reviews under the Endangered Species Act, the Migratory Bird Treaty Act, and the Bald and Golden Eagle Protection Act. The Trustees have completed consultation under the Coastal Zone Management Act for the purposes of this Phase III early restoration planning process. Coordination has been initiated for Historic Preservation Act. The Trustees have considered public comment and information relevant to environmental concerns bearing on the proposed actions or their impacts. Trustees' determination on selection of this project will be included in the Record of Decision.

Throughout the design process, every practical attempt would be made to avoid and minimize potentially adverse environmental, social, and cultural impacts. The following BMPs and conservation measures (sorted by resource type) would be utilized to minimize impacts to resources:

- Geology and Substrates
    - During the construction of the native landscape/nursery area, vegetation would be planted to stabilize the soil. Any necessary fill material would be clean and would likely originate from the area.
    - A helical pier foundation system would be utilized to construct the boardwalk and Outdoor Education Center, which would avoid soil excavation and reduce the impact to vegetation.
- Hydrology and Water Quality
    - A helical pier foundation system would be utilized to construct the boardwalk and Outdoor Education Center. This would minimize water quality impacts and would not require traditional or vibratory pile driving.
    - Shading as a result of the construction of the boardwalk and Outdoor Education Center would be minimized by appropriate material that would allow light penetration to the marsh.
    - During the design process, wetlands would be avoided in the final siting of pullovers and turnarounds, and opportunities would be identified to treat stormwater runoff in pervious areas to the extent practical.
- Green House Gas Emissions
    - Shut down idling construction equipment, if feasible.
    - Locate staging areas as close to construction sites as practicable to minimize driving distances between staging areas and construction sites.

    - Encourage the use of the proper size of equipment for the job to maximize energy efficiency.
    - Encourage the use of alternative fuels or power sources for generators at construction sites, such as propane or solar power, or use electrical power where practicable.
- Flora
    - Remove the minimum amount of vegetation necessary, use well-maintained tools to prevent damage when pruning adjacent or overhanging vegetation, and reduce soil compaction that would prevent regrowth of vegetation by minimizing the amount of heavy equipment.
- Protected Species
    - Measures to protect Gulf Sturgeon. No in-water work will occur in Gulf Sturgeon critical habitat in the Pearl River. All available construction best management practices will be used to prevent and control any runoff to ensure none reaches the Pearl River.
    - Measures to protect Louisiana black bear. All workers will be informed of the potential for Louisiana black bear presence. If this species uses the project area it will likely be transitory in nature and likely will occur to the west of the proposed project area within the river corridor. If any bears are found to be present in the immediate project area during project activities, construction will be halted until the species move away from the project area. Construction best management practices (i.e. minimize noise and habitat disturbance) will be used to avoid or minimize any impacts during construction.
- Migratory Birds
    - Pre-construction nesting surveys would be conducted and, if evidence of nesting is found, coordination with the USFWS would be initiated to develop and implement appropriate conservation measures.
- Public Health and Safety
    - Recycling collection areas would be established for paper, cardboard, aluminum cans and plastic bottles, as appropriate.
- Invasive Species
    - All equipment to be used during the project, including personal gear, will be inspected and cleaned such that there is no observable presence of mud, seeds, vegetation, insects (especially ants and snails), and other species.
    - Native vegetation will be used for planting. Prior to bringing to vegetation to the island, it will be inspected and "non-target[7]" species will be removed.

[7] A non-target species is any species that is present on the species of choice but is not desirable and should be removed.

- General Construction BMPs
    - Construction in Mississippi is required to follow the "Erosion Control, Sediment Control and Stormwater Management on Construction Sites and Urban Areas" and the "Field Manual for Erosion and Sediment Control on Construction Sites in Mississippi" (MDEQ 2005).
    - All construction activities would occur in daytime hours.

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10.6 Popp's Ferry Causeway Park: Project Description

10.6.1 Project Summary

The proposed Popp's Ferry Causeway Park Project would improve a portion of a site in Back Bay, in Harrison County, Mississippi, that is owned by the City of Biloxi by expanding a park environment where visitors could experience the coastal estuarine ecosystem. The intent is to restore lost recreational use. The project would provide for construction of an interpretive center, nature trails, boardwalks, and other recreational enhancements and would enhance visitor access to the adjacent coastal estuarine environment while updating and constructing amenities, which would allow visitors to fish, crab, and observe nature. The estimated cost for this project is $4,757,000.

10.6.2 Background and Project Description

The mostly unimproved 10-acre Popp's Ferry Causeway property is a parcel of land and marsh located just to the west of the Popp's Ferry Bridge. It is owned by the City of Biloxi, Mississippi. It is surrounded by water on all sides, including the Biloxi River to the north, Big Lake to the west, and the Back Bay to the south and east (Figure 10-9). The property was purchased by the City of Biloxi in the year 2000. Improvements were started in 2001, but these were destroyed by Hurricane Katrina in 2005. Construction commenced again in 2011, and the following work has been completed and is not included in this proposed Early Restoration project: boardwalk system (north of the boat launch), some shoreline stabilization, a marsh boardwalk and shelters in the northern portion of the area, some utility work, construction of an entry sign, construction of one fishing pier, some roadway lighting, and roadway repairs on the east side of the causeway.

The Early Restoration project currently being proposed would upgrade the existing site and amenities by creating the Popp's Ferry Causeway Park, an interactive location where the public would continue to fish, crab, and walk through a system of boardwalks and nature trails that allow viewing of the waterfront and marshes. One of the project goals is to build upon what the public perceives as the "best fishing spot without a boat in Biloxi, Mississippi." The proposed conceptual plan includes components that would enhance visitor access to coastal estuarine habitats such as roadway repair and lighting, construction of a concession and bait stand where the public can also rent kayaks, construction of new fishing piers, and continuation of an 8-ft.-wide concrete walkway/wooden boardwalk on the west side of the site with benches and lighting. Riprap water edge treatment would replace existing treatments (intermittent riprap consisting of limestone, construction debris, and other materials) west of the concrete walkway/wooden boardwalk for additional shoreline stabilization. In addition, picnic areas, nature trails, visitor parking and construction of a new Interpretive Center with outdoor exhibits would take place in upland areas, and a marsh overlook pier and boardwalk would be included (Figure 10-10).

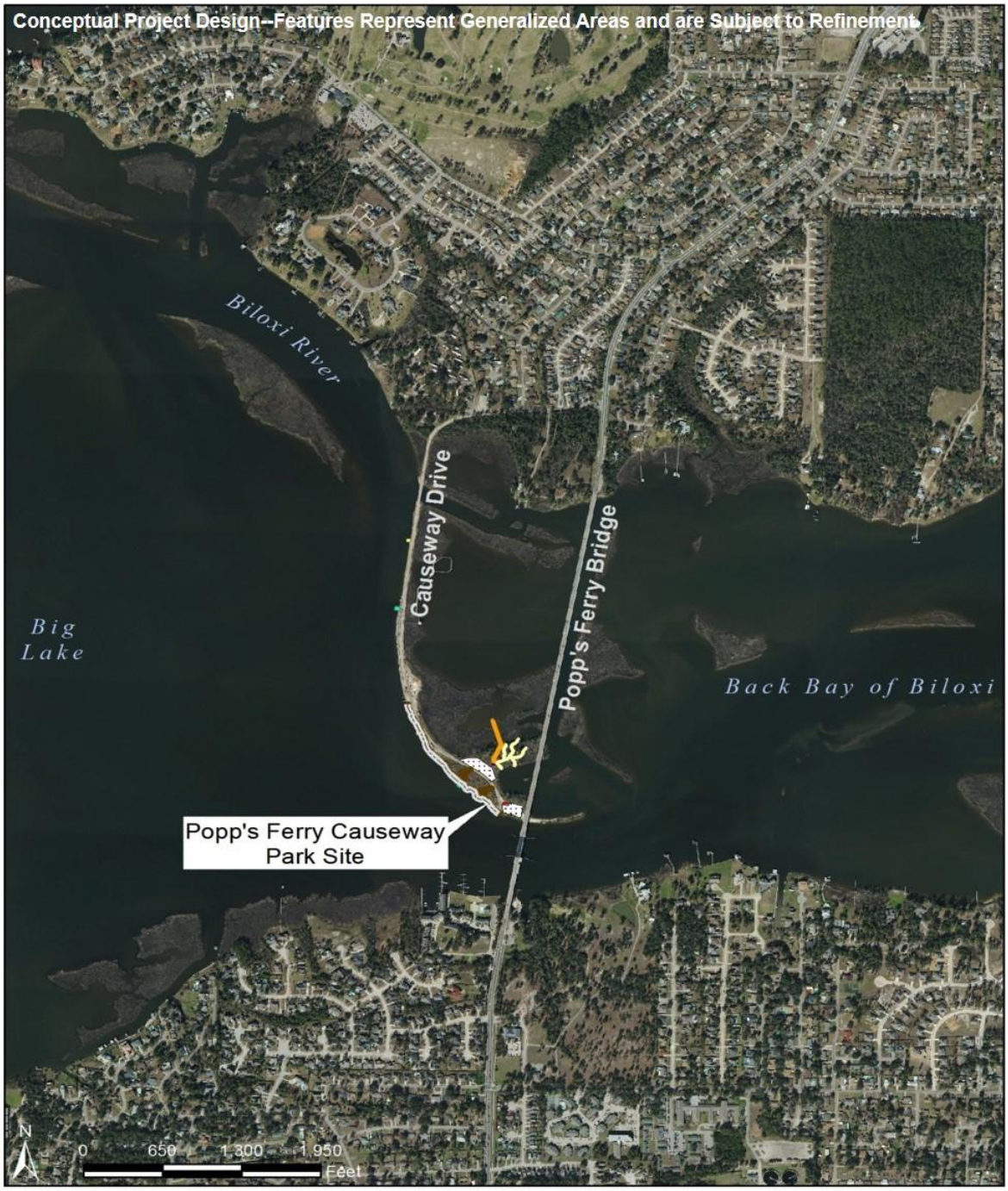

Figure 10-9. Proposed Popp's Ferry Causeway Park area.

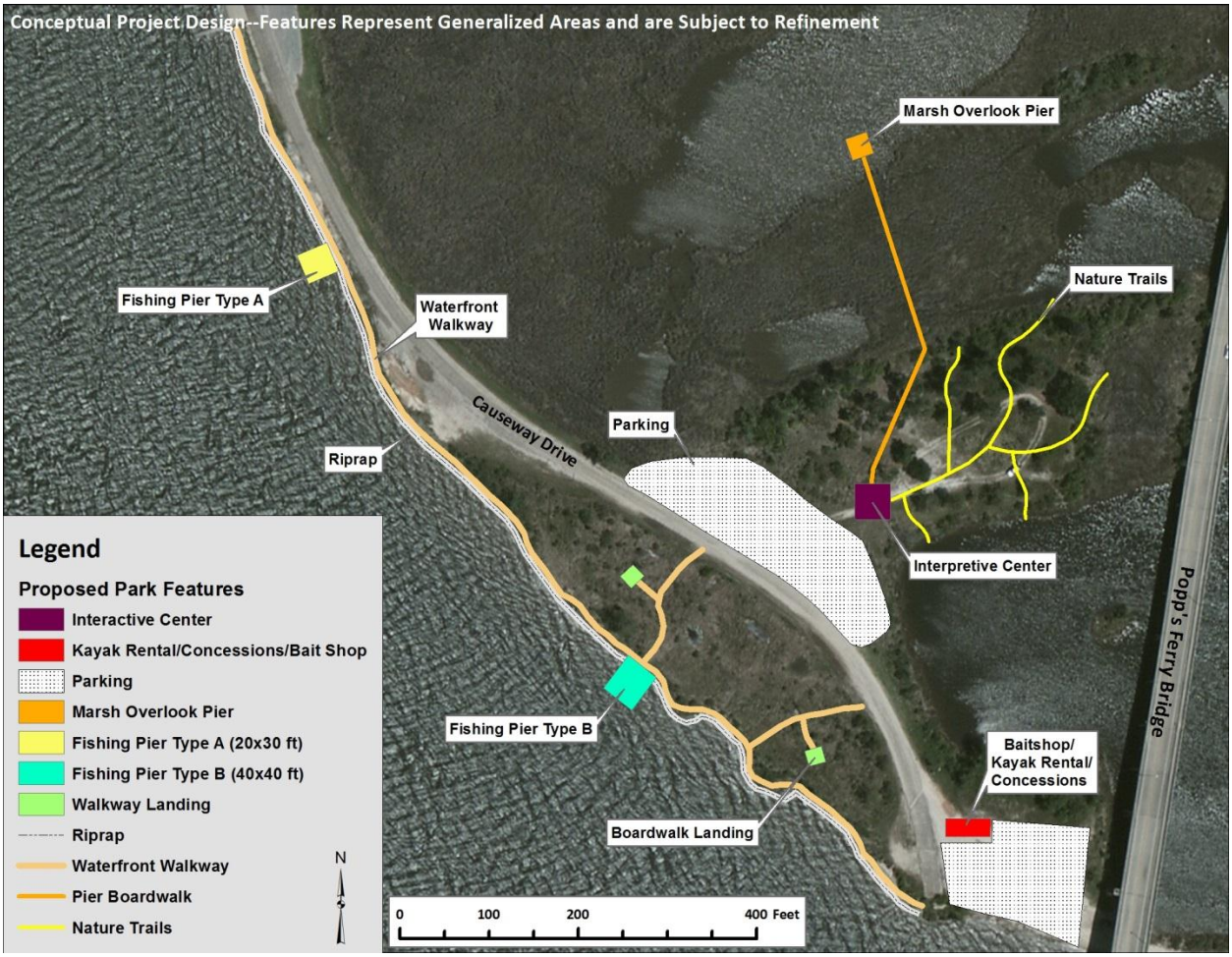

Figure 10-10. Proposed Popp's Ferry Causeway Park conceptual plan.

10.6.3 Evaluation Criteria

This project meets the evaluation criteria established for the Oil Pollution Act (OPA) and the Framework Agreement. As a result of the Spill, the public's access to and enjoyment of the natural resources along the Mississippi Gulf Coast was denied or severely restricted. The project would enhance the public's use and/or enjoyment of natural resources by constructing and/or expanding an educational interpretive center, nature trails, piers, and other recreational enhancements that would enhance visitor access to the adjacent coastal estuarine environment and provide opportunities for visitors to fish, crab, and observe nature (Section 7.1; Table 7.1). Accordingly, the project is intended to replace or provide recreational opportunities comparable to the types of opportunities lost as a result of the Spill (see C.F.R. § 990.54(a) (2) and Sections 6a-6c of the Early Restoration Framework Agreement). The project is technically feasible, utilizes proven techniques with established methods and documented results, and can be implemented with minimal delay. Similar projects have been successfully implemented in the area. Further, cost estimates are based on similar past projects, and the project can be conducted at a reasonable cost. For these reasons, the project is considered feasible, cost effective, and has a high likelihood of success. (See C.F.R. § 990.54(a) (1) and (3) and Section 6(e) of the Early Restoration Framework Agreement.) A thorough environmental review, including review under applicable

environmental statutes and regulations, is described in section 10.7, indicates that adverse effects from the project would largely be minor, localized, and often of short duration. In addition, the best management practices and measures to avoid or minimize adverse effects described in 10.7 would be implemented. As a result, collateral injury would be avoided and minimized during project implementation (construction and installation and operations and maintenance) (15 C.F.R. § 990.54(a)(4)). The project is consistent with the anticipated long-term restoration needs and was included as a priority in City of Biloxi Comprehensive Plan (adopted December 2009). The project would not have adverse impacts to public health and safety (see Section 3.3.6 Public Health and Safety). Popp's Ferry Causeway Park was submitted as a restoration project on the NOAA website (http://www.gulfspillrestoration.noaa.gov).

10.6.4 Performance Criteria, Monitoring and Maintenance

Successful completion of the project would meet the project's restoration objective to enhance recreational opportunities as well as provide access for enhanced appreciation and awareness of the surrounding natural resources impacted by the Spill. The Trustees would incorporate monitoring efforts to ensure project designs are correctly implemented. Additionally, the Trustees would monitor public use of the project and associated features for recreational activities and access to the natural resources. Monitoring would include visitor counts to reflect the number of visitors to the project during monitoring a five year period upon completion of construction. The monitoring period would conclude five years after the completion of construction. The City of Biloxi would be responsible for maintenance of the Popp's facilities, features, and exhibits.

10.6.5 Offsets

NRD Offsets are $7,135,500 expressed in present-value 2013 dollars, based on a benefit-to-cost ratio of 1.5, to be applied against the monetized value of lost recreational use provided by natural resources injured in Mississippi, which would be determined by the Trustees' assessment of lost recreational use by the Spill. Please see Chapter 7 of this document (Section 7.2.2) for a description of the methodology used to develop monetized Offsets.[8]

10.6.6 Cost

The total estimated cost to implement this project is $4,757,000. This cost reflects current cost estimates developed from the most current information available to the Trustees at the time of the project negotiation. The cost includes provisions for planning, engineering and design, construction, monitoring, and potential contingencies.

[8] For the purposes of applying the NRD Offsets to the calculation of injury after the Trustees' assessment of lost recreational use for the Spill, the Trustees and BP agree as follows:

- The Trustees agree to restate the NRD Offsets in the present value year used in the Trustees' assessment of lost recreational use for the Spill.
- The discount rate and method used to restate the present value of the NRD Offsets will be the same as that used to express the present value of the damages.

10.7 Popp's Ferry Causeway Park: Environmental Review

10.7.1 Introduction and Background

The proposed project would enhance the interactive nature of the existing Popp's Ferry Causeway Park (Figure 10-11) by constructing new amenities and updating existing features. These enhancements would replace lost recreational opportunities by providing improved access to the adjacent coastal estuarine habitats. Local residents have used the mostly undeveloped Popp's Ferry Causeway for fishing, shrimping, boating, walking, jogging, biking, and other shoreline activities for many years. The City of Biloxi purchased the property in 2000 and the Popp's Ferry Causeway Park Master Plan was developed. Partially constructed in the early 2000s, the property and infrastructure sustained damage from Hurricane Katrina in 2005. The proposed project enhances coastal recreational access and opportunities. Improvements such as boardwalks, nature trails, an Interpretive Center, fishing piers, and other amenities intend to provide access to shoreline habitats and replacement opportunities for coastal-based recreation that was lost during the Spill and response activities.

For the purpose of assessing the construction impact on the environment, the project description is based on the current design concept. Final engineering and project design could result in revisions to the project. The following description is intended to be a conservative review of the project components in order to evaluate a maximum environmental impact in the NEPA review and in environmental permitting. Project refinement(s) are anticipated as part of the design process. To the extent possible, revisions would be restricted to the current project footprint.

10.7.1.1 Concrete Walkway and Wooden Boardwalk

Along the western edge of the park, south of the boat launch, the project proposes the construction of an 8-ft.-wide concrete walkway and wooden boardwalk that would extend approximately 1,313 linear ft. along the shoreline (Figure 10-11). Benches, low-impact lighting, and shoreline viewing landings would be installed to make this shoreline walkway more enjoyable.

10.7.1.2 Shoreline Stabilization (Riprap)

The placement of approximately 1,366 linear ft. of riprap water edge treatment would extend along the western boundary of the park for shoreline stabilization. Riprap placement would begin immediately south of the boat launch.

10.7.1.3 Fishing Piers

Up to four fishing piers are proposed for construction on the western shoreline of the project area. Two Type A piers would have an area of 20 ft. by 30 ft. and two Type B piers would have an area of 40 ft. by 40 ft. Currently, there are limited locations for fishing within the park and new piers would greatly increase fishing opportunities, especially for visitors who do not have access to a boat.

10.7.1.4 Interpretive Center

An Interpretive Center would be constructed just to the east of a new parking area to provide new amenities for further enjoyment of the shoreline. This facility would be constructed in an open-air style and would provide exhibits on the park and its natural resources, as well as restrooms. This building would be surrounded by appropriate landscaping and connect to other parts of the park through a network of nature trails.

Figure 10-11. Popp's Ferry Causeway Park and vicinity.

10.7.1.5 Causeway Drive Improvements/Parking Areas

Causeway Drive currently connects the mainland to the future location of Popp's Ferry Causeway Park and runs the length of the property. Improvement of this two-lane road south of the boat launch would enable easier access to the enhanced park and its amenities. At the southern end of the project area is a larger upland area where most of the new park amenities are to be constructed. A new parking area is proposed for land adjacent to the east side of the road in this upland area. Additionally, a hard-packed gravel and soil area is to be paved at the very southern end of the park. The addition of these parking areas would allow for increased public visitation of the park.

10.7.1.6 Nature Trails/Picnic Areas

Interconnecting nature trails with several picnic areas are proposed throughout the site. The trails would connect several major amenities within the park area, including the Interpretive Center and parking areas, to the outer reaches of the property. These trails are meant to increase public access to and enjoyment of nature in general and, specifically, the surrounding coastal environment.

10.7.1.7 Marsh Overlook Pier and Boardwalk

A 6-ft.-wide wooden boardwalk (approximately 390 linear ft.) is proposed to extend from the Interpretive Center to the northeast through the estuarine emergent marsh and would end with a marsh overlook pier located on the open water. This would allow the public to have access to the wetland habitats for viewing opportunities of the associated wildlife and scenery.

10.7.1.8 Bait Shop/Concession Stand/Kayak Rental

A facility housing a bait shop, concessions, and kayak rentals is proposed for the southeastern most portion of the project area. This would be located next to the proposed new parking lot.

10.7.1.9 Landscaping

This proposed project would landscape the degraded and disturbed portions of the park property with native vegetation for a more enjoyable experience. Landscaping would be placed around the Interpretive Center and bait shop/concession stand/kayak rental facility, along Causeway Drive and other appropriate locations.

10.7.1.10 Utilities

To support the installation of restrooms and the bait shop/concession stand/kayak rental facility, the project would be connected to existing sewer, water, and electric utility infrastructure on Cambridge Drive, located in the residential neighborhood to the north (Figure 10-11).

10.7.2 Project Location

The proposed Popp's Ferry Causeway Park project would improve approximately 10 acres in Back Bay in the City of Biloxi, Mississippi. The parcel is owned by the City of Biloxi, Harrison County, Mississippi, just to the west of the Popp's Ferry Bridge (Figure 10-11). The project site is located in Section 22, Township 7 South, Range 10 West. The project site is surrounded by the waters of the Biloxi River to the north, Big Lake to the west, and the Back Bay of Biloxi to the south and east. This location provides access to the Gulf of Mexico. However, because the project site is not located directly on Mississippi Sound, it is less vulnerable to damage from hurricanes than sites located directly on Mississippi Sound. In addition to the Popp's Ferry Bridge, other nearby developments include residential neighborhoods approximately 3,250 ft. north and 750 ft. south of the project. An existing road, Causeway Drive, runs from the residential

area to the north along the western boundary of the causeway to the southeastern shoreline. The latitude/longitude of the center of the project area is 30.4177833333333°N, 88.9766833333333°W.

10.7.3 Construction and Installation

Construction methods and activities are included in order to assess the impact on the environment. Actual construction methods and activities would be determined after final design and would likely be comparable to activities described below. It is expected that actual construction methods would be similar to those presented in this section.

The construction and installation of proposed project elements would require the use of small dozers, loaders, excavators, forklifts, backhoes, haul trucks, and track-mounted Bobcats. If heavy equipment is necessary for any construction or installation work in sensitive areas, wetland mats and low ground pressure equipment would be used in order to minimize damage. Access for all water-side construction would be from a working barge which would include a crane, vibratory hammer, clamshell bucket, and other equipment.

Staging for construction would be confined to the site, and the contractor could be directed to stage equipment in areas that have been previously disturbed and that do not contain wetlands. This project would likely involve some amount of redistribution of fill already present within the project area.

10.7.3.1 Concrete Walkway and Wooden Boardwalk

Before construction and installation of the concrete walkway and lighted wooden boardwalk, site preparation activities would include demolition of old pilings, concrete slabs, broken asphalt, and concrete steps along the shoreline and the subsequent grading and compaction of the concrete walkway/boardwalk area only. The designs for the shoreline path include two distinct elements: one constructed of concrete and others constructed of wooden materials. Therefore, the final installation would require the placement of concrete (approximately 500 linear ft.; approximately 4,000 square ft.) and the installation of a wooden piling super structure to be complemented with conventional support framing and composite decking (approximately 813 linear ft.; approximately 4,878 square ft.) along the upland edge of the shoreline. Using the same approach, lighted, wooden connector boardwalks (approximately 355 linear ft.; approximately 2,130 square ft.) featuring landings would connect the main shoreline to more landward areas. Pile installation would be accomplished through the use of a vibratory hammer head attached to a track-mounted excavator (trackhoe). Wood piles 12 inches in diameter would be used in this project. The boardwalk portions of this feature would require approximately 100 pilings, which would take approximately six days to install. The planking would consist of fully recycled composite decking material. Low-impact lighting would be installed along the waterfront shoreline path.

10.7.3.2 Shoreline Stabilization (Riprap)

Replacing and establishing approximately 1,366 linear ft. of clean concrete/conglomerate riprap at the water's edge along the western and southern project boundaries would stabilize the shoreline and protect the walkway. The shoreline to the north of the project has recently been completed using the same treatment. Both a land-based and waterside access via a float barge would be necessary to deploy the riprap from the open water channel west of the shoreline.

10.7.3.3 Fishing Piers

With the shoreline cleared of existing concrete debris, the construction of four fishing piers would extend out from the concrete walkway or wooden boardwalk and would require the driving of 12-inch-diameter wood pilings in open water using the previously mentioned vibratory hammer technique. Using the pilings as a foundation, conventional support framing and decking would be employed to construct all piers to the applicable specifications. The two Type A piers would be 20 ft. by 30 ft. and would have a total area of 600 square ft. each. The two Type B piers would be 40 ft. by 40 ft. and would have a total area of 1,600 square ft. each. Each Type A pier would contain 12 to 15 pilings and would require approximately one day to install. The Type B fishing piers would require 25 to 30 pilings and would require approximately two days to install.

10.7.3.4 Interpretive Center and Bait Shop/Concession Stand/Kayak Rental

Site preparation for the approximately 1,600-square-ft. Interpretive Center and the approximately 1,000-square-ft. bait shop/concession stand/kayak rental includes the clearing and grubbing of vegetation within the designated upland areas, using the same approach as described above. The Interpretive Center would be constructed on shallow foundations. The bait shop/concession stand/kayak rental facility would be constructed on pilings.

10.7.3.5 Causeway Drive Improvements/Parking Areas

Improvements to the existing asphalt road and construction of additional parking areas would require minimal clearing and grubbing milling and reuse of existing asphalt, as well as re-grading and compacting the natural substrate. The placement of asphalt road and parking areas as well as associated grading work would use equipment such as conventional moto-graders, smooth drum rollers or other compaction equipment, and paving machines. These features would be boarded by concrete curbs in addition to the installation of drainage features and standard 16-inch lighting and low-impact lighting where necessary. Approximately 1.0 acre of upland would be paved for parking lots. Approximately 1,296 linear ft. of existing roadway would be improved.

10.7.3.6 Nature Trails/Picnic Areas

Following any necessary clearing and grubbing work, approximately 3,860 square ft. of nature trails and picnic areas would be installed throughout the project area using natural pervious materials such as mulch. No hardened materials or impervious surfaces such as concrete would be used for these trails.

10.7.3.7 Marsh Overlook Pier and Boardwalk

The construction of the marsh overlook pier (approximately 625 square ft.) and boardwalk (approximately 390 linear ft.) would require the driving of 12-inch pilings using a vibratory hammer mounted to a trackhoe. All piles used in this project would be wood piles 12 inches in diameter. The construction of this feature would require approximately 125 wood pilings, which would take eight days to install. The pier and boardwalk foundation would be graded plank and the decking would be composite decking material.

10.7.3.8 Landscaping

Landscaping work is intended for areas surrounding the trails and picnic areas as well as around the constructed facilities, parking areas, and roadway. Preparation for landscaping activities would involve the removal of unusable soils, vegetation, trees, stumps, and debris followed by the placement of clean materials such as topsoil, sand, gravel and/or mulch on the proposed surfaces. After clearing and

grubbing, trees and shrubs would be planted and seed would be spread along the roadway and around areas disturbed during construction. All landscaping work would use native species to the extent possible.

10.7.3.9 Utilities

The inclusion of restrooms in the Interpretive Center would require the construction of a new pump station and installation of a sanitary sewer main and new force main. Electrical and water, in addition to sewer and force main utilities, would be installed in trenches of approximately 3 ft. along Causeway Road to a maximum depth of approximately 6 ft. These utilities would run approximately 4,749 linear ft. from both the Interpretive Center and the bait shop/concession stand/kayak rental and tie into existing utilities located within the residential neighborhood to the north (Figure 10-11).

Construction in Mississippi is required to follow the "Erosion Control, Sediment Control and Stormwater Management on Construction Sites and Urban Areas" and the "Field Manual for Erosion and Sediment Control on Construction Sites in Mississippi" (MDEQ 2005). The construction of the proposed project would follow these guidelines as well as any other BMPs in order to prevent, control, and mitigate for any adverse impacts.

10.7.4 Best Management Practices

Throughout the design process, every practical attempt would be made to avoid and minimize potentially adverse environmental, social, and cultural impacts. The BMPs and conservation measures that would be utilized to minimize impacts to resources are listed in Section 10.7.7, Summary and Next Steps.

10.7.5 Operations and Maintenance

The constructed Popp's Ferry Causeway Park would be operated by the City of Biloxi Parks and Recreation Department. The City would likely lease the operation of the bait shop/concession stand/kayak rental facility to an independent entity. This lessee would determine the specifics of the kayak rental/concession stand/bait rental operation, including operation hours and products available. The overall park property would remain open and accessible 24 hours a day. The maintenance of the Popp's Ferry Causeway Park and associated features would be controlled by the City of Biloxi. It is anticipated that maintenance activities would include activities such as replacement of light bulbs for street lighting, trash removal, mowing in grassed areas, and possible noxious/invasive plant removal.

10.7.6 Affected Environment and Environmental Consequences

Under the National Environmental Policy Act, federal agencies must consider environmental effects of their actions that include, among others, impacts on social, cultural, and economic resources, as well as natural resources. The following sections describe the affected resources and environmental consequences of the project.

10.7.6.1 No Action

Both OPA and NEPA require consideration of the No Action alternative. For this Final Phase III ERP proposed project, the No Action alternative assumes that the Trustees would not pursue the Popp's Ferry Causeway Park as part of Phase III Early Restoration.

Under the No Action alternative, the existing conditions described in the affected resources subsection would prevail. Restoration benefits associated with this project would not be achieved at this time.

10.7.6.2 Physical Environment

Geology and substrates, hydrology, water quality, air quality, greenhouse gas emissions, and noise are discussed in this section.

Geology and Substrates

Affected Resources

Data from the Mississippi State Geological Survey generally indicates that surface soils in the project area consist of Holocene-age coastal deposits of loam, sand, gravel, and clay. The United States Department of Agriculture (USDA) Natural Resource Conservation Service (NRCS) Web Soil Survey identifies three soil mapping units within the footprint of the proposed project. These soil map units and their approximate percent of the project footprint area are: Handsboro association (93.1 percent); Eustis loamy sand, 0 to 5 percent slopes (0.8 percent); and Eustis and Poarch soils, 8 to 17 percent slopes (0.3 percent) (NRCS 2013a). Of these soils, the Handsboro association soil is listed as hydric, and two inclusions of the Eustis and Poarch soils—8 to 17 percent slopes—are listed as hydric (NRCS 2013b). A hydric soil is defined as one that formed under conditions of saturation, flooding, or ponding long enough during the growing season to develop anaerobic conditions in the upper part. Most of the project features are proposed for the southern portion of the footprint, which consists of Handsboro association soil. These soils are very poorly drained, moderately permeable, deep soils typically found in regularly flooded salt marshes and tidal flats with 0 to 1 percent slopes (NRCS 2013c). The Eustis loamy sand, 0 to 5 percent slopes, and Eustis and Poarch soils, 8 to 17 percent slopes, are present along a small portion of the northern residential roadway area designated for utility connection work. USDA NRCS reports that the Eustis loamy sand, 0 to 5 percent slopes, mapping unit is somewhat excessively drained and found on upland sites (NRCS 2013c). Eustis and Poarch soils, 8 to 17 percent slopes, are somewhat excessively drained to well drained and found on slopes (NRCS 2013c). Site visits indicate that there are hydric soils within the project area, and this is confirmed by information presented in the City of Biloxi Comprehensive Plan.

Site visits to the southern project area determined that much of the soil has been disturbed and compacted due to decades of human activity and use. It is assumed that dredged material from the channel and/or the construction of the Popp's Ferry Bridge was deposited at various locations throughout the site over a period of time. The upland areas with higher elevations, such as those in the northeastern portion of the lower park area, are likely locations of dredged material.

Environmental Consequences

The overall project footprint encompasses approximately 10 acres. Each project feature would disturb smaller localized areas within this footprint. Localized clearing and grubbing and other site preparation activities could impact soils to a maximum depth of 4 ft. below ground surface while utility installation could impact to a depth of 6 ft. below ground surface. Dewatering is anticipated in certain areas; water would be discharged to a vegetated pervious area for infiltration. Project features and corresponding approximate disturbance areas are listed in Table 10-21.

Table 10-21. Approximate disturbance areas within the Popp's Ferry Causeway Park.

PROJECT FEATURE	APPROXIMATE DISTURBANCE AREA (ACRES)
Connector and Boardwalks	0.25
Shoreline Stabilization	0.09
Fishing Piers	0.10
Interpretive Center	0.04
Bait Shop/Concession Stand/Kayak Rental	0.02
Marsh Overlook and Pier	0.23
Nature Trails and Picnic Area	0.03
Road Improvements	0.50
Parking	1.00
Landscaping	4.20
Utility Work	0.30

Paving: Areas within the footprint of the concrete shoreline walkway (0.09 acre) and parking areas (1.00 acre) would be compacted and covered with impervious material. Of the total parking, only 0.38 acre consists of new parking acreage; the remaining 0.60 acre would be hard-packed dirt and gravel. There would be long-term moderate impacts to substrates from these features within the relatively small footprint.

Upland Pile Driving: The bait shop/concession stand/kayak rental facility would be constructed on pilings that would be installed using a vibratory hammer. The two facilities would cover over a total of 0.06 acre of soil. There would be long-term minor adverse impacts to geology and soil due to the soil coverage and the pile installation within the relatively small footprint. The Interpretive Center would be constructed on shallow-spread footing foundations and would not require pile installations.

In-Water Pile Installations: The four fishing piers and marsh overlook pier and boardwalk would also impact sediment on the bay floor through pile installation using a vibratory hammer. This would result in short-term, minor adverse impacts to geology and substrate in localized areas. The installation of in-water piles would disturb the substrate and compact it within the immediate footprint of the pile. In-water pile installation would also result in short-term minor impacts when sediment is displaced. However, these sediments would settle on the bay floor in the immediate vicinity of the pile shortly after the pile is installed to its ultimate depth. Long-term, minor adverse impacts to geology and soil would result within the relatively small footprint of the individual piles.

Trails and Picnic Areas: The nature trail/picnic areas and landscaping area project elements would include the use of native materials and would not include fill or creation of any impervious areas. Therefore, only short-term minor impacts to soils would occur during clearing and grubbing preparation for native planting. Clearing, grading, and actual construction work requires the use of heavy equipment and machinery, which would result in soil disturbance and compaction. As the ground is cleared and disturbed in preparation for construction, the exposed soil is subject to possible wind or water erosion. Contractors would be instructed to avoid the clearing of trees and minimize disturbance and compaction in wetlands where permitted activities would occur. A Construction General Permit would be required because the land disturbance exceeds 5.0 acres. Construction BMPs including those described in "Erosion Control, Sediment Control and Stormwater Management on Construction Sites and Urban Areas" and the "Field Manual for Erosion and Sediment Control on Construction Sites in Mississippi"

would be used to prevent, control, and mitigate any soil, sediment, and substrate impacts including soil erosion due to wind and water. If necessary, riprap placement by float barge would prevent further soil disturbance and compaction during that portion of the project. Due to preparation work such as clearing and equipment usage required for all project features, all features would result in short-term, minor adverse impacts on soils and substrates within their specific localized immediate construction zones. Work in wetlands, waters of the U.S., and navigable waters would require a Mississippi Coastal Wetland Protection Act Permit as well as U.S. Army Corps of Engineers Section 404 and Section 10 Permits. This is discussed in detail in Section 10.6.5.2 *Hydrology and Water Quality*.

Findings: Adverse impacts from construction on geology and substrates would be short term and long term. Displacement and compaction of existing soils to hard surface for upland piles and parking lot areas would result in long-term minor adverse impacts. For most construction elements, the adverse impacts would be localized to small project area footprints and would be mainly within previously disturbed areas. For shoreline stabilization, boardwalks, marsh overlooks, and piers, disturbance would be minimized to the maximum extent possible.

10.7.6.3 Hydrology and Water Quality

Affected Resources

Hydrology

The project area is located within the Biloxi Bay watershed and includes estuarine wetlands and estuarine deep water habitats surrounding Popp's Ferry Causeway Park. The surrounding waterbodies are the Biloxi River, Big Lake, and the Back Bay of Biloxi. The open water habitats of the Biloxi River navigation channel to the west and south have deeper water, whereas Back Bay of Biloxi waters to the north and east are shallower. NOAA bathymetry charts show that water depths are approximately 14 to 23 ft. adjacent to the western and southern boundaries and approximately 1 to 2 ft. on the northern and eastern sides. The project site is approximately 12.5 navigable miles from the Mississippi Sound and is tidally influenced.

Wetlands

There are five types of wetlands and other waters of the U.S. in the project area: estuarine marsh, open water, emergent/scrub shrub wetlands, shoreline emergent wetlands, and forested/emergent wetlands (Table 10-22; Figure 10-12). Wetlands and other waters, their classifications, and characteristics are described below.

Table 10-22. Wetlands and waters of the U.S. in the Popp's Ferry Causeway Park.*

WETLAND TYPE	TOTAL IN PROJECT AREA	WETLAND IMPACTS	FACILITY
Estuarine Marsh (NWI)	0.18 acre	0.03 acre	Marsh Boardwalk
Open Water	0.02 acre	0.02 acre	Marsh Overlook Pier and Boardwalk
Emergent/Scrub Shrub	1.62 acres	0.25 acre	Shoreline Walkway and Landings
Shoreline Emergent Disturbed/ Existing Riprap	1,500 linear ft.	1,366 linear ft.	Shoreline Stabilization (riprap)
Forested/Emergent	0.04 acres	0	NA
*See Figure 10-12 for locations of National Wetlands Inventory (NWI) features and delineated wetlands.			

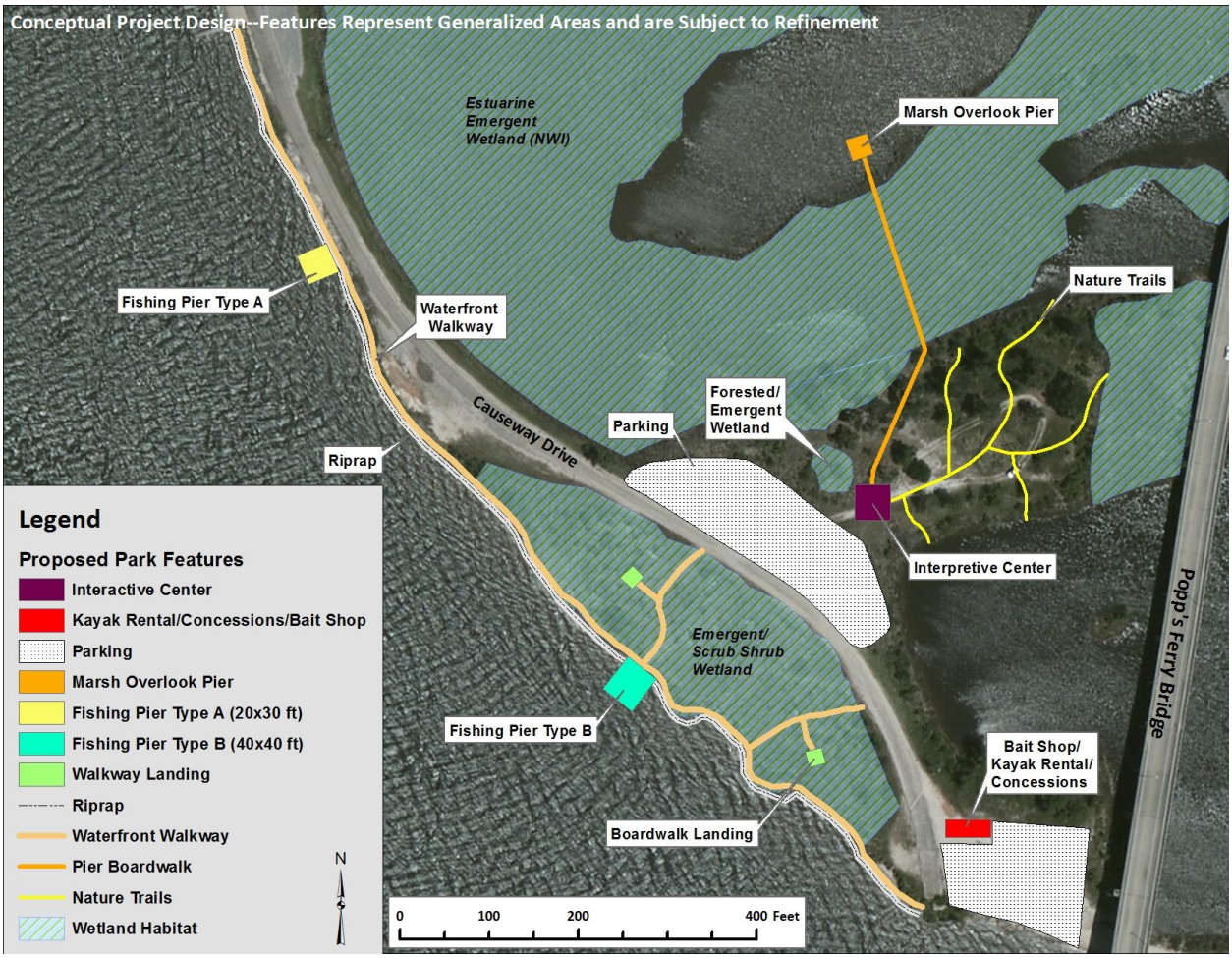

Figure 10-12. Map of wetlands and upland areas.

Estuarine Marsh (NWI/Delineated)

Estuarine marsh is extensive in the Popp's Ferry Causeway Park project vicinity (Figure 10-12). The marsh is an intertidal emergent wetland with dominant vegetation including black needlerush (*Juncus roemerianus*), salt meadow cordgrass (*Spartina patens*), saltgrass (*Distichlis spicata*), saltmarsh morning-glory (*Ipomoea sagittata*), and Jesuit's bark (*Iva frutescens*). The National Wetlands Inventory (NWI) map indicates 0.18 acre of estuarine marsh within the project area. However, only 0.15 acre was delineated within the project area. The delineated wetland is an extension of the salt marsh habitat directly downslope and is characterized by thick cover of salt meadow cordgrass (*Spartina patens)*.

Open Water

The open water area in the Popp's Ferry Causeway Park is a small (0.02 acre) intertidal lagoon surrounded by intertidal estuarine marsh. A boardwalk and marsh overlook is planned in the area (Figure 10-12).

Emergent/Scrub Shrub (Delineated)

The emergent/scrub shrub wetland is a 1.62-acre area in the southwestern portion of the project area. Hydrology in the emergent/scrub shrub wetland is perched with exposure to intertidal hydrology in high-water events. The wetland is moderately to heavily disturbed and is marked with man-made depressions and a sediment berm that flanks a shoreline emergent-disturbed habitat. Vegetation within the emergent/scrub shrub wetland is brackish marsh (seaward) and tidal fresh marsh (landward) with more salt-tolerant species occurring in a gradient toward the shoreline. Drifted wrack lines are common on the seaward side approximately 10 ft. inshore. Dominant brackish species include needlerush, salt meadow cordgrass, saltgrass, saltmarsh morning-glory, and Jesuit's bark. Common freshwater marsh plants in the area include various sedges (*Cyperus* spp.), bushy bluestem (*Andropogon glomeratus*), beakrush (*Rhynchospora* spp.), spikerush (*Eleocharis* spp.), saw-grass (*Cladium jamaicense*), and broadleaf cattail (*Typha latifolia*). Additionally, there are numerous locations in the area that retain standing water and areas that contain algal mats on the sediment surface (Figure 10-12).

Shoreline Emergent (Disturbed/Existing Riprap)

Discontinuous shoreline emergent wetlands are found in the southwestern area of the site bordering the navigation channel and are intermingled with riprap for approximately 1,500 ft. along the existing shoreline from the Popp's Ferry Causeway Bridge northwest to an existing pier (Figure 10-12). The disturbed wetland community is intertidal and vegetation is interspersed with riprap in this disturbed area and is similar to the adjacent emergent/scrub shrub wetland.

Palustrine Emergent and Forested Wetland (Delineated)

Upland to the site, the palustrine emergent/forested wetland area (0.04 acre) appears to be a man-made depression or pit that has retained water and wetland vegetation around a somewhat concentric circle around the ponded area (Figure 10-12). It is completely surrounded by upland habitat. Black willow (*Salix nigra*) trees are found growing on the periphery of the pond. Plant species in the area include saw-grass (*Cladium jamaicense*) and soft rush (*Juncus effusus*).

Floodplains

The southern portion of the project site is classified as flood hazard Zone AE while the northern portion is mainly Zone VE with a small portion classified as Zone X (FEMA 2009). Zone AE indicates that the area is within the 100-year (1-percent-annual chance) floodplain and there is a high risk of flooding; the project area has base flood elevations of 15 to 16 ft. within this zone. Zone VE indicates that the area is within a coastal flood zone with hazards from high velocity wave action. It is within the 100-year (1-percent-annual chance) floodplain and there is a high risk of flooding; the project area has a base flood elevation of 18 ft. within this zone. Zone X indicates that the area is outside the 500-year (0.2-percent-annual chance) floodplain and the risk of flooding is minimal.

Water Quality

In the late 1990s, impairment from pathogens led to the development of a total maximum daily load (TMDL) for the waters around the project area. A fecal coliform TMDL for the Back Bay of Biloxi and Biloxi Bay was approved in 2002, and the waterbodies were removed from the 303(d) list of impaired waterbodies. Currently, the waters surrounding the project area are not impaired. An advisory regarding fish consumption is in place for king mackerel due to mercury for the Gulf of Mexico, which includes the waters surrounding the Popp's Ferry Causeway Park (MDEQ 2012b).

Environmental Consequences

Hydrology

In-water construction includes placement of four fishing piers, shoreline stabilization, and a boardwalk/marsh overlook pier. The construction would not appreciably affect tidal hydrology in the project area. Upland construction of the Interpretive Center, parking lots, boardwalks, trails, bait shop/concession stand/kayak rental facility, and picnic areas would not add appreciably to stormwater runoff in the area. To the extent possible, pervious, vegetated treatment areas would be incorporated into the final design to facilitate stormwater storage and treatment throughout the site. Construction of the Popp's Ferry Causeway Park facilities would not have an adverse impact to site hydrology.

Wetlands

Wetland impacts are summarized in Table 10-22 above. Although the proposed boardwalk would not disturb the delineated estuarine marsh, it would traverse the downslope estuarine marsh area for access to the marsh overlook pier. Construction of the marsh overlook pier/boardwalk could have a minor long-term impact on 0.02 acre of open water and 0.03 acre of estuarine marsh (Table 10-22). Construction of the shoreline walkway and landings could result in a 0.25-acre impact to emergent/scrub shrub wetland. The construction would result in shading of vegetation of 0.25 acre under the pier and boardwalks. There would be some disturbance to vegetation in the immediate area of each feature due to movement of construction equipment. Constructing the boardwalk to allow sunlight to penetrate would reduce these shading effects and allow vegetation to regrow.

Although construction of the marsh overlook pier/boardwalk would affect 0.03 acre of emergent marsh habitat through shading, this represents only a small portion of the total emergent marsh habitat located in the surrounding area, which would continue to support local and regional vegetative communities. Similarly, the shoreline walkway and landings would affect 0.25 acre of emergent/scrub shrub wetland; however, this represents a small portion of the total 1.62-acre area of this habitat located on the project site. The palustrine emergent and forested wetland is in the area of the proposed Interpretive Center but would be avoided during construction. Overall, there would be short-term minor impacts to wetland habitats during construction. There would be long-term impacts to wetlands filled as a result of the proposed project, but because of the small footprint of project features and the overall availability of the wetland habitats onsite, these impacts would also be minor.

The shoreline would be stabilized with riprap; the treatment would be similar to stabilization work to the north of the existing pier. The shoreline stabilization (riprap) area would result in a long-term moderate impact to 1,366 linear ft. of vegetated shoreline. The existing shoreline is a mosaic of discontinuous wetland vegetation and riprap including concrete debris. Some segments of the shoreline are experiencing substantial erosion. Stabilization in this partially degraded and eroding system is required for the shoreline as well as for the shoreline walkway.

A Mississippi Coastal Wetland Protection Act Permit and a U.S. Army Corps of Engineers Clean Water Act Section 404/10 permit would be needed for all work in wetlands and other jurisdictional waters. Under the Coastal Zone Management Act of 1972, selected restoration projects must be consistent to the maximum extent practicable with the federally-approved coastal management programs for the states in which the projects are to be conducted. On December 12, 2013the Federal Trustees submitted a consistency determination to the MDMR for this project for appropriate state reviews coincident with

public review of the Draft Phase III ERP/PEIS. On February 4, 2014, the MDMR responded and concurred with the federal determination for the project for purposes of finalizing this early restoration plan (Miller 2014).

The proposed discharge of dredged or fill material into waters of the United States, including wetlands, or work affecting navigable waters associated with this project is currently being coordinated with the U.S. Army Corps of Engineers (USACE) pursuant to the Clean Water Act Section 404 and Rivers and Harbors Act (CWA/RHA). On March 3, 2014, an application requesting Mississippi Coastal Wetland Protection permit authorization was submitted to Mississippi Department of Marine Resource (MDMR). Shortly after receiving the application, MDMR notified the USACE of the application and began the USACE permitting process (SAM-2014-00275-TMZ). Coordination with the MDMR and USACE is ongoing, and final authorization pursuant to Coastal Zone Management Act of 1972 and the CWA/RHA will be completed prior to project implementation.

The current site design has been developed to avoid and minimize impacts on wetlands. Contractors would be instructed to minimize disturbance during construction in wetlands. In addition, the Trustee would adhere to the conditions of the Mississippi Coastal Wetland Protection Act and Clean Water Act permits.

Floodplains

Construction of the Interpretive Center and bait shop/concession stand/kayak rental facility would be above base flood elevations that are designated for the area. Although there would be construction in the floodplain, the construction or operation of the proposed project would not increase flood risk or change floodplain values. The installation of utility connection to tie into the mainland utilities would have no impact on flooding.

Water Quality

Sediment from construction and contaminants (e.g., gas, oil, lubricants) from construction equipment could degrade surrounding waterbodies and/or groundwater. Dewatering may be required for subsurface work such as utility installation. Water would be discharged to a vegetated pervious area for infiltration. Appropriate BMPs would be used to prevent, control, and mitigate potential impacts. Following construction, the paving of parking lots and the concrete shoreline walkway could affect local water resources in two ways. First, as the ground is converted to an impervious surface, it would allow a greater quantity of water to enter the local waterbodies during precipitation events. A less-pervious surface would mean less infiltration and water quality treatment. Second, the stormwater runoff from these impervious surfaces could contain contaminants swept from the parking lot (e.g., car fluids, gas, and oil) or trash and debris that could pollute the surrounding waterbodies. To the extent possible, pervious, vegetated treatment areas would be incorporated into the final design to facilitate stormwater storage and treatment throughout the site. There would be short-term and long-term minor and localized impacts on surface water and groundwater hydrology and water quality.

The “Erosion Control, Sediment Control and Stormwater Management on Construction Sites and Urban Areas” (MDEQ 2012a) document describes several categories of erosion and sediment control BMPs. These include surface stabilization, runoff conveyance, inlet protection, sediment control, and stream protection BMPs and site preparation techniques. The exact BMPs used during construction activities would not be identified until construction contractor(s) are selected. Additionally, stormwater BMPs,

which attempt to limit or treat contaminants and the quantity of water running off into waterbodies, can be either structural or non-structural and use infiltration, filtration, or retention/detention as well as planning or site design. A Construction General Permit for stormwater would be necessary as the site is greater than 5.0 acres.

10.7.6.4 Air Quality and Greenhouse Gas Emissions

Affected Resources

The U.S. Environmental Protection Agency (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), the EPA has promulgated National Ambient Air Quality Standards (NAAQS). Under the CAA, the EPA establishes primary and secondary air quality standards. Primary air quality standards protect the public health, including the health of "sensitive populations, such as people with asthma, children, and older adults." Secondary air quality standards protect public welfare by promoting ecosystems health, and by preventing decreased visibility, and damage to crops and buildings. The EPA has set NAAQS for the following six criteria pollutants: ozone, particulate matter (PM 2.5 and 10), nitrogen dioxide (NO_2), carbon monoxide (CO), sulfur dioxide (SO_2), and lead.

Air Quality

Mississippi has adopted the federal standards (Table 10-23). According to the MDEQ, the entire state of Mississippi (including Harrison County) is classified as in attainment, meaning criteria air pollutants do not exceed the NAAQS. Air quality conditions in the project area are good as there are no existing pollutant sources.

Table 10-23. State and federal ambient standards for criteria air pollutants.

POLLUTANT	AVERAGING PERIOD	STATE AND FEDERAL PRIMARY STANDARD
Ozone	8-hour	0.075 ppm
	1-hour (daily max.)	0.12 ppm
PM2.5	Annual (arithmetic mean)	15.0 µg/m3
	24-hour	35 µg/m3
PM10	Annual (arithmetic mean)	NA
	24-hour	150 µg/m3
Carbon Monoxide	8-hour	9 ppm
	1-hour	35 ppm
Nitrogen Dioxide	Annual (arithmetic mean)	0.053 ppm
	1-hour	0.100 ppm
Sulfur Dioxide	Annual (arithmetic mean)	0.03 ppm
	24-hour	0.14 ppm
	1-hour (per annum)	NA
	1-hour (per 7 days)	NA
	5-minute	NA
Lead	Rolling 3-month average	0.15 µg/m3
	Quarterly average	1.5 µg/m3

POLLUTANT	AVERAGING PERIOD	STATE AND FEDERAL PRIMARY STANDARD
Total Suspended Particulates	Annual (geometric mean)	NA
	24-hour	NA

Greenhouse Gases

Greenhouse Gases (GHGs) are chemical compounds found in the earth's atmosphere that absorb and trap infrared radiation as heat. Global atmospheric GHG concentrations are a product of continuous emission (release) and removal (storage) of GHGs over time. In the natural environment, this release and storage is largely cyclical. For instance, through the process of photosynthesis, plants capture atmospheric carbon as they grow and store it in the form of sugars. Human activities such as deforestation, soil disturbance, and burning of fossil fuels disrupt the natural cycle by increasing the GHG emission rate over the storage rate, which results in a net increase of GHGs in the atmosphere. The principal GHGs emitted into the atmosphere through human activities are CO_2, methane, nitrous oxide, and fluorinated gases, such as hydrofluorocarbons, perfluorocarbons, and sulfur hexafluoride, with CO_2 as the major GHG emitted.

Environmental Consequences

Air Quality

Project implementation would require the use of heavy equipment, which could temporarily lead to air quality impacts from equipment exhaust. In addition, fine particulate matter (fugitive dust) associated with road improvements, parking, shoreline stabilization, and construction of facilities and trails, may become airborne during the construction process. No air quality permits are required for this type of project, and violations of state air quality standards are not expected.

Air quality impacts during construction are expected to be localized, minor, and short term.

Greenhouse Gas Emissions

The use of gasoline and diesel-powered construction vehicles and equipment, including small trucks, dump trucks, concrete trucks, Bobcats, grading and paving machines, trackhoes, dozers, cranes and tugboats and other equipment would contribute to an increase in GHG emissions. Table 10-24 details the construction equipment needed to complete the project, the total hours used for each type of equipment, and the emissions resulting from the use of equipment.

Based on the assumptions detailed in Table 10-24, the project would generate approximately 357.76 metric tons of GHGs over the duration of all phases. The following mitigation measures have been identified to reduce or eliminate GHG emissions from the project.

- Shut down idling construction equipment, if feasible.
- Locate staging areas as close to construction sites as practicable to minimize driving distances between staging areas and construction sites.
- Encourage the use of the proper size of equipment for the job to maximize energy efficiency.
- Encourage the use of alternative fuels or power sources for generators at construction sites, such as propane or solar power, or use electrical power where practicable.

Findings: Air quality impacts during construction are expected to be localized, minor, and short term. Project construction would generate approximately 357.76 metric tons of carbon equivalents. The project would have short-term minor impacts but no long-term impacts on GHG emissions. Mitigation measures would minimize GHG emissions.

Table 10-24. Greenhouse gas impacts for the Popp's Ferry Causeway Park.

EQUIPMENT DESCRIPTION	TOTAL HOURS USED	CO_2 FACTOR-MT*/100HRS	CO_2 (MT)	CH_4 FACTOR-MT/ 100HRS	CH_4 (MT)	NO_2O FACTOR-MT/ 100HRS	NO_2O (MT)	TOTAL CO_2 (MT)
Dump Tucks / Flatbed Truck	481	1.70	8.18	0.50	2.41	7.20	34.63	45.21
Concrete Trucks	64	1.70	1.09	0.50	0.32	7.20	4.61	6.02
Line Truck	48	1.25	0.60	0.40	0.19	5.50	2.64	3.43
Pick-Up Trucks	2112	1.10	23.23	0.35	7.39	4.40	92.93	123.55
Bobcat (bare and w/auger mount)	248	2.65	6.57	0.9	2.23	10.60	26.29	35.09
Moto Grader	20	2.25	0.45	0.65	0.13	1.08	0.22	0.80
Milling Machine	8	2.55	0.20	0.85	0.07	10.2	0.82	1.09
Paving Machine	80	2	1.60	0.50	0.40	8	6.40	8.40
Rollers	100	2	2.00	0.50	0.50	8	8.00	10.50
Trackhoe (w/Bucket/Thumb or Vibratory Attachments)	428	2.55	10.91	0.85	3.64	10.2	43.66	58.21
Dozer	52	2.25	1.17	0.65	0.34	1.08	0.56	2.07
Forklift	208	2.25	4.68	0.65	1.35	1.08	2.25	8.28
Ditchwitch	86	0.75	0.65	0.35	0.30	4	3.44	4.39
Crane (bare and w/clamshell attachment)	148	2.55	3.77	0.85	1.26	10.20	15.10	20.13
Tug Boat (8 trips)	8	-----	5.20	-----	1.60	-----	20.80	27.60
Georgia Buggies	40	1.35	0.54	0.4	0.16	5.75	2.30	3.00
Total	**4131**							**357.76**
*MT = metric tons								

10.7.6.5 Noise

Affected Resources

The Noise Control Act of 1972 (42 U.S.C. 4901 to 4918) was enacted to establish noise control standards and to regulate noise emissions from commercial products such as transportation and construction equipment. The standard measurement unit of noise is the decibel (dB), which represents the acoustical energy present. Noise levels are measured in A-weighted decibels (dBA), a logarithmic scale which approaches the sensitivity of the human ear across the frequency spectrum. A 3-dB increase is equivalent to doubling the sound pressure level, but is barely perceptible to the human ear. Table 10-25 presents some familiar sounds and their decibel levels.

Table 10-25. Familiar sounds and their decibel levels (dB).

SOUND	DECIBEL LEVEL (DB)
Whisper	30
Normal Conversation	50 – 65
Vacuum Cleaner at 10 ft.	70
Midtown Manhattan Traffic Noise	70 – 85
Lawnmower	85 – 90
Train	100
Nearby Jet Takeoff	130

Project Area Noise Levels and Receptors

Existing ambient noise is consistent with noise from developed areas as well as natural wetland and marine environments. Popp's Ferry Bridge parallels the eastern side of the park and this traffic noise is noticeable on the eastern portion of the project area, especially the noise associated with vehicles crossing the drawbridge section of the bridge. The southern portion of the project area is located between 0 and 650 ft. away from the centerline of the Popp's Ferry Bridge. A traffic noise investigation was prepared for the Environmental Assessment for Alternative "E" for improvements to Popp's Ferry Road and Bridge between Riverview Drive to Pass Road in Biloxi, Harrison County, Mississippi (MDOT 2010). Sound levels of 59 – 64 L_{eq} dBA were recorded at non-causeway sites that were 55 – 145 ft. from the centerline along Popp's Ferry Road. The portion of the project area north of the existing boat launch has similar noises, although this area is farther away from the Popp's Ferry Bridge centerline. There is also likely some noise from sporadic boat traffic using the Biloxi River channel on the western side of the park and barge traffic using the navigation channel south of the Popp's Ferry Causeway Park. Ambient noise includes low-flying C-131 transports from Keesler Air Force Base. Natural noise includes sounds emitted by resident wildlife and wave action on windy days. The closest residence is located 750 ft. to the south of the project area.

Marine Mammals

The Marine Mammal Protection Act requires evaluation of activities that could injure or cause behavioral change in marine mammals. Noise impacts to fish are also considered here. Within water, noise levels decrease with increasing distance from the pile installation source. This noise attenuation is typically cylindrical in shallower water and spherical in deeper water. Vibratory pile installation produces less sound (approximately 10 – 20 dB) than impact pile installation; however, the increased time and therefore overall sound produced with vibratory hammers could be greater (Caltrans 2009). Use of wood piles also produces less noise than other pile materials as does smaller pile diameters (Caltrans 2009). Injury impact thresholds occur closest to the source, whereas behavior impact threshold levels occur at a further distance from the source.

Environmental Consequences

Human/Terrestrial Wildlife Receptors

During construction, the use of general construction equipment would have short-term, minor adverse noise impacts. The noise impacts would take place only during construction periods and would not close the entire project area to visitors. During the installation of the wood piles with a vibratory hammer, terrestrial wildlife and humans (visitors and residents) may be disturbed due to noise. However, the duration needed for pile driving is short; in addition to using a vibratory hammer to minimize noise,

every effort would be made to minimize the time required for pile installation. Impacts associated with vibratory hammer pile driving would be short term and moderate.

Marine Mammals

Several project features require piling and the use of vibratory hammer installation equipment. In-water piling installation would be necessary for constructing the four fishing piers, marsh overlook pier, and the associated marsh boardwalk. Pile installation could also be necessary for upland construction of the bait shop/concession stand/kayak rental facility. Potential impacts on marine and coastal aquatic life from insertion of pilings would be due to the noise created from the vibration generated by the equipment. During use of this equipment, a vibratory motion would propagate through the pile and radiate a pulse into the water, ground substrate, and air. The planned installation of the pilings would be brief in duration.

The Trustees coordinated with NOAA to ensure that there would be no takes or harassments of marine mammals as a result of project construction. The Trustee intends to take a number of precautionary measures to ensure that there is no disturbance to marine mammals in the project area, and in particular, to manatees and cetaceans (dolphins). All construction personnel involved in in-water work that generates noise would be responsible for observing water-related activities for the presence of marine mammals, in particular, dolphins and manatees. The Trustee, or designee, shall advise all construction personnel regarding the civil and criminal penalties for harming, harassing, or killing West Indian manatees, which are protected under the Endangered Species Act of 1973. All vessels associated with the construction project shall operate at “no wake/idle” speeds at all times and in all water depths where the draft of the vessel provides less than a 4-ft. clearance from the bottom. Construction contractors would preferentially follow deep-water routes (e.g., marked channels) whenever possible. If marine mammals are seen, all work (pile driving) would cease until the animal has left the project area. The Trustee, or designee, would have monitors onsite during pile installation to ensure that these conditions are met.

Findings: There would be short-term, minor adverse noise impacts to residents and visitors as a result of excavators and other construction equipment during the period of construction for the park features, with short-term, moderate adverse impacts during the very short period of pile installation. The Trustee will consult with NOAA and NMFS to determine noise impacts for the project and minimization measures.

10.7.6.6 Biological Environment

Living Coastal and Marine Resources

Affected Resources

The living coastal and marine resources in the project area include those associated with estuarine and marine wetlands, shallow coastal water habitats, and disturbed uplands.

Flora

Dominant vegetation in the brackish habitats includes black needlerush, salt meadow cordgrass, saltgrass, saltmarsh morning-glory, and Jesuit’s bark. Tidally influenced freshwater marsh species include black willow (*Salix nigra*), saw-grass, yellow-eye grass (*Xyris* spp.), bushy bluestem, broadleaf cattail, as well as sedges and rushes. The upland habitats contain slash pine (*Pinus elliottii*) stands and

live oak (*Quercus virginiana*) trees. Estuarine brackish marsh flanks the project area to the east and is composed primarily of black needlerush assemblages. A survey for sub-aquatic vegetation (SAVs) was completed for the marsh overlook pier and boardwalk area. There is no SAV in the project area.

Fauna

The faunal species found in the area include those associated with natural estuarine marsh pocket beaches, and disturbed upland habitats. These include various species of mammals, birds, fish, reptiles, infauna, epifauna, and other aquatic invertebrates. The Mississippi diamondback terrapin (*Malaclemys terrapin pileata*) utilizes pocket beaches adjacent to marsh for nesting habitat.

The mixing of fresh water from rivers with saline water from the Mississippi Sound allows for a range of fish species in the waters surrounding the Popp's Ferry Causeway Park including redfish (*Sciaenops ocellatus*), blue catfish (*Ictalurus furcatus*), flounder (*Paralichthys lethostigma*), speckled trout (*Cynoscion nebulosus*), white trout (*Cynoscion arenarius*), southern kingfish (*Menticirrhus americanus*), sheepshead (*Archosargus probatocephalus*), and black drum (*Pogonias cromis*), as well as crab and shrimp species. The estuarine emergent wetland habitat supports an array of neonate and juvenile fish and aquatic invertebrates. Other fish and marine mammals such as Atlantic bottlenose dolphins (*Tursiops truncates*) could also occur in the area.

Environmental Consequences

Flora

Construction of the concrete walkway, new parking area, Interpretive Center, bait shop/concession stand/kayak rental facility, nature trail, and picnic areas would involve minimal clearing and grubbing in the construction footprint. However, the land within these footprints, in its current state, is partially disturbed. Following construction, cleared areas outside the footprint would be replanted and reseeded with trees, shrubs, and other suitable vegetation. There is adequate habitat within the project area and vicinity to ensure continued viability of native species. The alteration of vegetation to recreational structures would result in long-term, minor adverse impacts. Clearing and grubbing would result in short-term, minor adverse impacts until vegetation is reestablished.

Construction of the wooden shoreline boardwalk, marsh overlook pier, and associated marsh boardwalk would impact floral resources by shading vegetation under the pier and boardwalks. Several boardwalks connecting the shoreline boardwalk to landings would be constructed through this wetland, totaling 355 linear ft. In addition, there could be some disturbance to vegetation in the immediate area of each feature due to movement of construction equipment. Construction of the boardwalk to allow penetration by sunlight would reduce these shading effects and allow vegetation to regrow. Installation of the pier and boardwalks would not appreciably diminish the availability of emergent marsh habitat in the project area that supports local and regional vegetative communities. There would be no fragmentation of vegetative communities and, therefore, short-term and long-term impacts would be localized and minor.

Fauna

Construction of the wooden boardwalks, marsh overlook pier, and boardwalk would result in short-term minor localized adverse impacts. Increased human presence after the project improvements are complete is anticipated; however, because these areas currently experience human presence, on

balance, adverse impacts to wildlife are expected to be minor or nonexistent. Construction of the wooden boardwalks, marsh overlook pier, and boardwalk would reduce availability of habitat underneath the structures for certain wildlife species; however, the project footprint represents only a small portion of the available habitat in the area for local wildlife. The Mississippi Department of Wildlife, Fisheries, and Parks (MDWFP) provided consultation on the Mississippi diamondback terrapin and requests minimizing riprap usage for shoreline stabilization at locations where pocket beaches might be present (Frey 2014). The Trustee would identify and also avoid pocket beaches to the maximum extent practicable in the design of the project.

Therefore long-term adverse impacts to wildlife would be minor. There would be long-term minor adverse impacts on fauna resulting from occasional disturbance to feeding or resting in localized areas.

The construction of the four fishing piers and marsh overlook pier would have short-term impacts for the aquatic organisms and benthic habitat during piling installation. The area of impact to both surface and benthic habitat is minor relative to the amount of each of these habitats available in the local and adjacent area. The Trustee coordinated with NOAA NMFS to determine impacts to cetaceans and to identify avoidance measures.

Marine Mammals

Affected Resources

Marine mammals found within the Gulf of Mexico include 21 species of cetaceans (whales and dolphins) and the West Indian manatee. The Marine Mammal Protection Act (MMPA) prohibits the "taking" of marine mammals incidental to a specified activity, unless such taking is appropriately authorized.

Dolphin Species

The bottlenose dolphin, *Tursiops truncatus*, and the Atlantic spotted dolphin, *Stenella frontalis*, are the two most common marine mammals found in the Gulf of Mexico. Both species feed primarily on fish, squid and crustaceans. While *S. frontalis* spends the majority of its life offshore, *T. truncatus* often travel into coastal bays and inlets for feeding and reproduction.

West Indian Manatee

The West Indian manatee (*Trichechus manatus latirostris*) is listed as endangered under the ESA. The species is endangered due to its small population size (less than 2,500 mature individuals with possible population decline), the possibility of at least a 50 percent future reduction in population size, and near- and long-term threats from human-related activities (FWS 2010; FWC 2007). Between October and April, manatees concentrate in areas of warmer water. During summer months, the species may migrate as far west as the Louisiana and Texas coast on the Gulf of Mexico. Manatees inhabit both salt and fresh water of sufficient depth (about 5 feet to usually less than 18 feet). Manatees will consume any aquatic vegetation available to them including sometimes grazing on the shoreline vegetation.

Marine Mammal Environmental Consequences

Noise and other activity associated with proposed construction may temporarily disturb certain dolphin species and manatee in the vicinity of the project area through temporary impacts on prey abundance, water quality (turbidity), and underwater noise, and may temporarily increase the potential for boat

collisions with certain species in the project area. However, the mobility of these species reduces the risk of injury due to construction activity. Based on the mobility of these species, the short duration of construction activities, and the proposed construction methodology, effects on dolphin species are not anticipated.

Extreme care should be taken during construction not to disturb or injure manatees. If manatee(s) are found to be present in the immediate project area during restoration activities, construction would be halted until the species moves away from the project area.

The procedures contained within the MMPA coordination and ESA consultation for West Indian manatee[9] constitute appropriate and responsible steps to promote compliance with MMPA prohibitions on take by requiring the proposed activities to achieve a standard of No Effect or May Affect, Not Likely to Adversely Affect for manatees (McClain 2014). As such, the Trustees do not anticipate any take, incidental or otherwise, under the MMPA for West Indian manatee due to implementation the proposed project.

As a result of coordination with NFMS Office of Protected Resources, the Trustees will implement the below listed measures to minimize the potential for incidental take of marine mammals:

- Establishment of Shut-Down Zone: The calculated radius for the 120 dB rms/Level B harassment zone (i.e., distance from driven pile to area where harassment would no longer be expected to occur) is 1,585 m. The area defined by this radius in all relevant directions from the pile driving activity will comprise the shut-down zone. Shut-down of pile driving activity would occur immediately upon observation of any marine mammal within or approaching this zone.
- Visual Monitoring and Shut-down of Pile Driving Activities: The shut-down zone will include all areas where underwater sound pressure levels are anticipated to equal or exceed the 120 dB threshold, as described under "Establishment of Shut-Down Zone." Qualified observers will monitor these zones and advise project personnel when delay or shut-down of pile driving activities is required. The shut-down zone will be monitored for the presence of marine mammals before, during, and after any pile installation activity, beginning 15 minutes prior to initiating the start of pile installation and continuing for 15 minutes following the completion of pile installation. If marine mammals are present within the shut-down zone prior to pile installation, the start of pile installation will be delayed until the animals voluntarily leave the shut-down zone and have been visually confirmed beyond the zone, or until 15 minutes have elapsed without redetection. Shutdown of pile driving activities will occur if any marine mammal enters or approaches the established zone, and will not resume until the animal has voluntarily moved beyond the relevant shut-down zone radius, either through visual confirmation or by waiting until 15 minutes has elapsed without redetection.
- Qualified biologists will be present on site at all times during pile driving activities. The action area will be monitored by at least three observers during vibratory pile driving. One will be based on land; two will be on vessels traveling along and within the radius while visually scanning the area.

[9] Implementing of the Service's most recent version of the Standard Manatee Conditions for In-water Work.

- Monitoring of the shut-down zone will be conducted using binoculars, spotting scopes and visual observations. Each monitor will have a radio for contact with other monitors or work crews. A GPS unit, range finder, or other suitable methodology will be used for determining the observation location and distance to marine mammals, vessels, and construction equipment.
- No pile driving will occur in low-light conditions, or when visibility is impaired such that the shut-down zone cannot be effectively monitored. Pile driving will only be conducted between one-hour post-sunrise through one hour prior to sunset. If waters exceed small craft advisories or conditions otherwise restrict biologists' ability to make observations or become unsafe for the observation boat to operate, pile installation will cease until conditions allow for monitoring to resume.

Protected Species

The U.S. Fish and Wildlife Service (USFWS) lists species as threatened or endangered when they meet criteria detailed under the ESA) of 1973, as amended (16 U.S.C. §1531 et seq.). Additionally, the Mississippi Wildlife Fisheries and Parks (MWFP) and NOAA National Marine Fisheries Service (NMFS) identify and list protected species. Section 7(a)(2) of the ESA requires that each federal agency ensures that any action authorized, funded, or carried out by the agency is not likely to jeopardize the continued existence of any endangered or threatened species or result in the destruction or adverse modification of critical habitat of those species. Migratory Bird Treaty Act compliance and Bald and Golden Eagle Protection Act compliance are discussed in this section.

Federally listed species that are known to occur or could occur in Harrison County are listed in Table 10-26. However, only the West Indian manatee, five sea turtle species and Alabama red-belly turtle are likely to occur or could pass through the project area.

Table 10-26. Popp's Ferry Causeway Park—threatened and endangered species in Harrison County, Mississippi.

COMMON NAME	SCIENTIFIC NAME	FEDERAL STATUS	STATE STATUS	HABITAT
Amphibians				
Dusky Gopher Frog	*Rana sevosa*	Endangered	Endangered	Sandy uplands and temporary pools
Birds				
Red-cockaded Woodpecker	*Picoides borealis*	Endangered	Endangered	Mature, open southern pine forests
Piping Plover	*Charadrius melodus*	Threatened	Endangered	Beaches and mudflats in southeastern coastal areas
Red Knot	*Calidris canutus rufa*	Proposed	--	Marine intertidal habitats including inlets, estuaries, and bays feeding in mud and sand flats on beaches and barrier islands
Ferns and Allies				
Louisiana Quillwort	*Isoetes louisianensis*	Endangered	--	Aquatic or wet habitats, mostly shallow streams in bottomland habitats (MDWFP 2001)
Fishes				
Gulf Sturgeon	*Acipenser oxyrinchus desotoi*	Threatened	Endangered	Migrates from large freshwater coastal rivers to brackish and marine coastal bays and estuaries
Mammals				
West Indian Manatee	*Trichechus manatus*	Endangered	Endangered	Fresh and salt water in large coastal rivers, bays, bayous and estuaries
Louisiana Black Bear	*Ursus americanus luteolus*	Threatened	Endangered	Bottomland hardwood forest; dispersal corridors
Reptiles				
Hawksbill Sea Turtle	*Eretmochelys imbricate*	Endangered	Endangered	Coral reefs, open ocean, bays, estuaries
Leatherback Sea Turtle	*Dermochelys coriacea*	Endangered	Endangered	Open ocean, coastal waters
Kemp's Ridley Sea Turtle	*Lepidochelys kempii*	Endangered	Endangered	Nearshore and inshore coastal waters, often in salt marshes; neritic zones with muddy or sandy substrate (NOAA Fisheries 2013b)
Green Sea Turtle	*Chelonia mydas*	Threatened	Endangered	Shallow coastal waters with SAV and algae, nests on open beaches
Loggerhead Sea Turtle[1]	*Caretta caretta*	Threatened	Endangered	Open ocean; also inshore areas, bays, salt marshes, ship channels and mouths of large rivers
Alabama Red-belly Turtle	*Pseudemys alabamensis*	Endangered	Endangered	Fresh and brackish habitats, river banks, submerged and emergent aquatic vegetation; upland habitat for nesting (MDWFP 2001; USFWS 2010)
Black Pine Snake	*Pituophis melanoleucus lodingi*	Candidate	Endangered	Open canopy longleaf pine/hardwood habitats with well-drained sandy soils and ground cover (MDWFP 2001; USFWS 2010)
Gopher Tortoise	*Gopherus Polyphemus*	Threatened	Endangered	Open canopy longleaf pine/scrub oak habitats with well-drained sandy soils and ground cover (USFWS 2010)

[1] Listed by NOAA National Marine Fisheries Service

Mammals

West Indian Manatee (*Trichechus manatus*): This species uses both fresh and saltwater habitats such as coastal rivers, bays, bayous, and estuaries. The manatee is an occasional visitor to Mississippi's coasts, although migration into the area is poorly understood. After wintering in Florida, and perhaps Mexico, manatees migrate northward during spring, including to Mississippi and Alabama waters, although these migrations are not well understood (Fertl et al. 2005). Manatees frequently seek out freshwater sources such as rivers and river mouths and have been known to be found near estuaries (Fertl et al. 2005). Seagrasses are the typical manatee forage material; however, they can also consume other aquatic vegetation, algae, and terrestrial vegetation (Fertl et al. 2005). There have been sightings of West Indian manatees in the project area (Fertl et al. 2005); however, given the lack of their main food source at the site, any manatee occurrence, if any, is expected to be transitory.

Reptiles

Hawksbill Sea Turtle (*Eretmochelys imbricata*): Although this species uses various habitats such as the open ocean, bays, and estuaries throughout different life stages, it is mainly associated with coral reefs. This species nests in Florida from April to November (NOAA Fisheries 2013a). It likely does not nest in Mississippi and observations are rare in the state (MDWFP 2001; NOAA Fisheries 2013a). The main dietary items of this species are sponges and other invertebrates (NOAA Fisheries 2013a).

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

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

Green Sea Turtle (*Chelonia mydas*): This species typically prefers shallow coastal waters with SAV and algae for foraging and nests on open beaches (NOAA Fisheries 2012). Nesting typically does not occur on mainland beaches and there is likely no Mississippi nesting at all (MDWFP 2001; NOAA Fisheries 2012). This species migrates long distances in the open ocean from nesting to feeding areas. Observations of this species in Mississippi are rare (MDWFP 2001).

Loggerhead Sea Turtle (*Caretta caretta*): Loggerhead habitat for foraging and migration includes open ocean, inshore areas, bays, salt marshes, ship channels, and mouths of large rivers. This sea turtle feeds on mollusks, fish, crustaceans, and other marine organisms. This species typically nests at night from late April through September (NOAA Fisheries 2013c). Although loggerheads occasionally use barrier islands for nesting, mainland nesting is rare (MDWFP 2001). Preferences for nesting beaches include

high high-energy coarse-grained beaches adjacent to the ocean that are narrow and steeply sloped (NOAA Fisheries 2013c). This species has been observed in nearshore waters of the Mississippi Sound during migration and foraging and has been accidentally caught by shore-based fishermen (MDWFP 2001).

Alabama Red-Belly Turtle (*Pseudemys alabamensis*): The habitat of the Alabama red-belly turtle includes fresh and brackish habitats, river banks, submerged and emergent aquatic vegetation, and upland habitat for nesting (MDWFP 2001; USFWS 2010). Within the project area, individuals of this species are known to be present in the Tchoutacabouffa River, the Biloxi River, and the Back Bay of Biloxi (MDWFP 2001; USFWS 2010); however, this species is mainly a freshwater species associated with river and stream channels and associated wetlands. Nesting occurs from mid-May to mid-July (MDWFP 2001).

Environmental Consequences

Protected Species

The West Indian manatee and Alabama red-belly turtle have potential to occur or pass through the project area. Sea turtles are also addressed in the environmental consequences discussion, but they are not known to occur in or near the project area.

West Indian Manatee

West Indian manatee observations in Mississippi have mainly been associated with barrier islands and offshore areas; however, there are infrequent documented sightings from within the Back Bay of Biloxi (Fertl et al. 2005). There are no known wintering habitats or refuge within the Back Bay of Biloxi, nor any populations that use the area. Manatees forage on SAV; however, no SAV is found within the project area. Although impacts to West Indian manatee are not expected, short-term, minor impacts could occur if an individual comes into contact with construction activities. The Trustee, or designee, shall advise all construction personnel regarding the civil and criminal penalties for harming, harassing, or killing West Indian manatees, which are protected under the Endangered Species Act of 1973. If manatee(s) are found to be present in the immediate project area during restoration activities, construction would be halted until the species moves away from project area.

Alabama Red-Belly Turtle

Alabama red-belly turtle habitat includes fresh and brackish waters, river banks and uplands, and submerged and emergent aquatic vegetation. Although suitable habitat for this species could be present in the project area, no observations have been recorded. The lack of SAV for foraging, as well as the presence of riprap, would make this species unlikely to be present in the project area. It is unlikely that there would be impacts to the Alabama red-belly turtle due to lack of habitat in the project area.

Sea Turtles

No specific occurrences of sea turtles are known for the project footprint; however, the five federally listed sea turtles (green, hawksbill, Kemp's Ridley, leatherback, and loggerhead) have been sighted in the Mississippi Sound. Both Kemp's Ridley and loggerhead sea turtles are known to be present in nearshore waters of the Mississippi Sound and have been accidentally captured by shore-based fisherman (MDWFP 2001). The open beach habitat preferred by sea turtles for nesting is not present within the project area. Therefore, these species are unlikely to be within the project area. If any sea

turtles are found to be present in the immediate project area during restoration activities, construction would be halted until the species moves away from project area. Precautionary measures would be utilized to prevent and minimize impacts to sea turtles. Precautionary measures would include construction personnel education, proper use and selection of siltation barriers, use of "no wake/idle" speeds in proper locations, adhering to protection guidelines when a sea turtle is within 100 yards of activities, and reporting turtle injuries.

Findings: ESA Section 7 consultations were completed with USFWS (McClain 2014) and NMFS (Crabtree 2014). The USFWS and NMFS each concurred that the project, as proposed, is not likely to adversely affect West Indian Manatee, Gulf Sturgeon, Kemp' s ridley, loggerhead, green sea turtles, (leatherback and hawksbill would be unaffected) or Gulf sturgeon so long as the following measures are taken:

- Conditions A-D of the Standard Manatee Conditions for In-water Work (USFWS 2011)
- Sea turtle and Smalltooth Sawfish Construction Guidelines (NMFS 2006) shall be followed when operating vessels or doing in-water work construction.
- Mississippi Department of Environmental Quality' s 3- volume manual Erosion Control, Sediment Control and Stormwater Management on Construction Sites and Urban Areas (MDES 2012) and the Field Manual for Erosion and Sediment Control on Construction Sites in Mississippi (MDEQ 2005) will be utilized.

No effects would occur to other listed, proposed, or candidate species considered during consultation (McClain 2014; Crabtree 2014).

Migratory Birds

Migratory bird guilds that could have presence in the Popp's Ferry project area include wading birds, seabirds, waterfowl, raptors, rails and coots, landbirds, and doves and pigeons (see Table 10-27).

Table 10-27. Migratory birds in the Popp's Ferry Causeway Park area.

SPECIES	BEHAVIOR	SPECIES/HABITAT IMPACTS
Wading birds (herons, egrets, ibises)	Foraging, feeding, resting, roosting	Wading birds primarily forage and feed at the water's edge. As such, they may be impacted locally and temporarily by the project. It is expected that they would be able to move to another nearby location to continue foraging, feeding and resting. These birds primarily roost in trees or shrubs (e.g., pines, *Baccharis*), but project components would not impact these habitats.
Seabirds (terns, gulls, double-crested cormorant, brown pelican)	Foraging, feeding, resting, roosting,	Seabirds forage and rest in the project area. As such, they may be impacted locally and temporarily by the project. It is expected that they would be able to move to another nearby location to continue foraging, feeding and resting. Nesting habitat does not exist in the project area; therefore, it is not anticipated to impact nesting.
Waterfowl (ducks, loons, and grebes)	Foraging, feeding, resting, roosting,	Waterfowl may forage, feed, rest, and roost in the project area. As such, they may be impacted locally and temporarily by the project. It is expected that they would be able to move to another nearby location to continue foraging, feeding and resting. These birds primarily roost and nest in low vegetation, which is not near the project area; therefore it is not anticipated to impact nesting.

SPECIES	BEHAVIOR	SPECIES/HABITAT IMPACTS
Raptors (osprey, hawks, owls)	Foraging, feeding, resting, roosting	Raptors forage, feed, and rest in the project area. As such, they may be impacted locally and temporarily by the project. It is expected that they would be able to move to another nearby location to continue foraging, feeding and resting. Most raptors are aerial foragers and soar long distances in search of food. Locations where these birds roost and nest are not within the project area.
Rails and Coots	Foraging, feeding, resting, roosting,	Rails and coots forage, feed, rest, or roost in the project area. As such, they may be impacted locally and temporarily by the project. However, they are most likely to favor marshy areas. It is expected that they would be able to move to another nearby location to continue foraging, feeding and resting if disturbed by the project. These birds primarily roost and nest in marshes, which are not directly within the project area; therefore, it is not anticipated to impact nesting.
Landbirds (white-eyed vireo, great crested flycatcher, indigo bunting)	Breeding, foraging, feeding, roosting	Various species of migratory birds in Mississippi use upland and freshwater wetland habitats including disturbed and human influenced areas. Breeding locations for these species could include open areas, open deciduous woodlands, shrub thickets, and forest edges especially near freshwater wetlands and waterbodies. The project area includes open disturbed areas with trees, grasses, shrubs, and other low vegetation as well as freshwater wetland depressions. No project features directly impact these habitats.
Doves and Pigeons	Foraging, feeding, roosting, resting	These species may use the upland habitat where trees and shrubs are available. It is expected that they would be able to move to another nearby location to continue foraging, feeding and resting.

Bald and Golden Eagle Protection Act

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

Environmental Consequences

Migratory Bird Treaty Act

The Trustee has reviewed the project site and determined that migratory bird nesting is not known, but is possible. The MBTA requires the protection of all migratory bird species and protection of ecosystems of special importance to migratory birds against detrimental alteration, pollution, and other environmental degradation. Coordination under MBTA with the USFWS was completed on January 24, 2014. Based on the implementation of BMPs, no “take” is anticipated. If activities require tree removal pre-construction surveys will be completed. If evidence of nesting is found, coordination with the USFWS would be initiated to develop and implement appropriate conservation measures.

Bald and Golden Eagle Protection Act

There are no golden eagles in the project area. No bald or golden eagles are known to nest within 660 ft. of the project area. Thus, no impacts to golden or bald eagles are anticipated. Coordination under BGEPA by the USFWS was completed on January 24, 2014. Since no nesting occurs, no “take” is anticipated.

Essential Fish Habitat

Essential fish habitat (EFH) consists of all waters and aquatic substrates and habitats that provide habitat for fish spawning, reproduction, feeding, and/or growth. The proposed project is located within an area designated as EFH for four Fishery Management Plans (FMP) governed by the Gulf of Mexico Fisheries Management Council (GMFMC). These fishery groups are Red Drum, Reef Fish, Coastal Migratory Pelagics, and Shrimp. Based on species habitat characteristics, depth preferences, and commonality of occurrence for all life stages as reported in the final environmental impact statement for the Generic Essential Fish Habitat Amendment of March 2004 (GMFMC 2004), nine of forty species could feasibly be present within the project area (Table 10-28). The waters and associated substrates of the following areas contain EFH for the listed fishery groups.

Red Drum FMP: All estuaries; Vermilion Bay, Louisiana, to the eastern edge of Mobile Bay, Alabama, out to depths of 150 ft.; Crystal River, Florida, to Naples, Florida, between depths of 30 and 60 ft.; and Cape Sable, Florida, to the boundary between the areas covered by the GMFMC and the South Atlantic Fishery Management Council (SAFMC), also between depths of 30 and 60 ft.

The red drum fishery is very common in the northern Gulf and the estuarine zone is used by this species in all life stages. Habitats with the highest use include nearshore hard bottoms, nearshore sand/shell, estuarine SAV, and estuarine soft bottoms (GMFMC 2004). Larvae, juveniles, and young adults spend the majority of their time in estuarine habitats and prey on a large array of species including blue crab eggs and juvenile fish (Table 10-28).

Reef Fish FMP: All estuaries; the U.S./Mexico border to the boundary between the areas covered by the GMFMC and the SAFMC from estuarine waters out to depths of 600 ft.

The reef fish fishery includes numerous species that use the estuarine zone during particular life stages. Most of these species are transitory and, therefore, just use the inshore environments during part of the year. Mutton and gray snapper use the estuarine zone for feeding as adults only; however, all reef species listed in Table 10-28 have the potential to use this zone as early or late juveniles for growth and feeding habitat. Most of the reef fish species in the area have low occurrences. Abundance levels for these types, including the grouper and snapper fishes, are much higher in the southern and eastern Gulf of Mexico. Juveniles of these species would typically use SAV beds in estuarine environments for food and cover (GMFMC 2004); Table 10-28.

Coastal Migratory Pelagic FMP: All estuaries; the U.S./Mexico border to the boundary between the areas covered by the GMFMC and the SAFMC from estuarine waters out to depths of 600 ft. Of the three coastal migratory pelagic species listed in the management unit, only the Spanish mackerel uses the estuarine zone during any life stage. Habitat use for all life stages is primarily the water column; however, the Spanish mackerel uses the estuarine zone during the early and late juvenile and adult life stages. Adults typically only use these shallow areas in the pursuit of baitfish and typically prefer higher-salinity waters (GMFMC 2004); Table 10-28.

Table 10-28. Essential fish habitat considerations for Popp's Ferry Causeway Park.

GULF OF MEXICO FMP GROUP	SPECIES	HABITAT TYPE	EGGS	LARVAE	POST LARVAE	EARLY JUVENILES	LATE JUVENILES	ADULTS	SPAWNING ADULTS
Red Drum Fishery	Red Drum *(Scianops ocellatus)*	SAV, soft bottom, sand/shell, emergent marsh		Growth; feeding	Growth; feeding	Growth; feeding	Growth; feeding	Feeding	Feeding
Reef Fish Fishery	Mutton Snapper *(Lutjanus analis)*	SAV, emergent marsh				Growth; feeding	Growth; feeding	Feeding	
	Cubera Snapper *(Lutjanus cyanopterus)*	SAV, emergent marsh				Growth	Growth		
	Gray Snapper *(Lutjanus griseus)*	SAV, soft bottom, sand/shell, emergent marsh			Growth; feeding	Growth; feeding	Growth; feeding	Feeding	
	Lane Snapper *(Lutjanus synagris)*	SAV, soft bottom, sand/shell			Growth	Growth; feeding	Growth; feeding		
	Yellowtail Snapper *(Ocyurus chrysurus)*	SAV, soft bottom				Growth; feeding			
Coastal Pelagic Fishery	Spanish Mackerel *(Scomberomorus maculatus)*	Pelagic				Growth; feeding	Growth; feeding	Growth; feeding	
Shrimp Fishery	Brown Shrimp *(Farfantepenaeus aztecus)*	SAV, soft bottom, sand/shell, emergent marsh, oyster reef			Growth; feeding	Growth; feeding	Growth; feeding		
	White Shrimp *(Litopenaeus setiferus)*	Emergent marsh, soft bottom			Growth; feeding	Growth; feeding	Growth; feeding		
Source: GMFMC 2004									

Shrimp FMP: All estuaries; the U.S./Mexico border to Fort Walton Beach, Florida, from estuarine waters out to depths of 600 ft.; Grand Isle, Louisiana, to Pensacola Bay, Florida, between depths of 100 and 2,000 ft.; Pensacola Bay, Florida, to the boundary between the areas covered by the GMFMC and the SAFMC out to depths of 200 ft., with the exception of waters extending from Crystal River, Florida, to Naples, Florida, between depths of 60 and 150 ft. and in Florida Bay between depths of 30 and 60 ft.

Shrimp fishery species that use the estuarine zone of the management unit include two penaeid types: brown and white shrimp. Post larvae, early juvenile, and late juvenile shrimp of both species use

estuarine habitat for survival. Emergent marsh and marsh edge are particularly important microhabitats for these species and they would use the tidal cycle to enter low emergent marsh adjacent to the shoreline (GMFMC 2004); Table 10-28.

Environmental Consequences

Red Drum FMP

Juvenile red drum could be impacted by marsh overlook pier and boardwalk construction activities during high tides when the young fish would use the emergent marsh habitat for feeding and cover. In addition, there would likely be short-term displacement of benthic invertebrate populations and small ichthyofauna and temporary displacement of adult fish on the shoreline boardwalk at the water's edge on the western project boundary. Adverse impacts to red drum EFH would be short term, minor and localized to the areas of pier pilings.

Reef Fish FMP

Most reef fish use estuarine habitat during some of their life stages; however, this use is transitory and not year-round, especially if used as foraging adults. Most juvenile reef fish use estuarine habitats within SAV beds (GMFMC 2004). Due to the lack of SAV in the project area, it is unlikely that there is a major presence of juvenile reef species in the area. Furthermore, reef fish numbers in the northern Gulf of Mexico are fairly low. The estuarine habitat in the area consists mainly of emergent marsh and soft sediments. Potential impacts during construction of the marsh overlook pier and boardwalk include disruption to larval fish movement during high-tide events and harm to benthic invertebrates, which are prey for many juvenile species. Therefore, only short-term, minor adverse impacts would be expected in the localized area of pier pilings.

Coastal Migratory Pelagic FMP

A majority of the habitat use by all life stages of coastal migratory pelagic species is within the water column habitat. However, estuarine habitats are one of many possible habitats used by Spanish mackerel in early and late juvenile and adult life stages. Estuarine habitat use is likely transitory and temporary during foraging activities. Adverse impacts to coastal migratory pelagic EFH would be short term, minor and localized to the areas of pier pilings.

Shrimp FMP

During boardwalk construction, potential impacts to shrimp species include possible disruption during high-tide events as individuals come in with the tide. During in-water pile driving, there could be possible disruption to species in the form of benthic habitat alteration. Soft-bottom habitat could be modified during construction activities and water quality decreased from surface water runoff. Impacts would be short term with localized disturbances only in areas of construction. Disturbed substrate would settle quickly. Therefore, only short-term, minor adverse impacts would be expected in the localized area of pier construction.

Findings: Adverse impacts to EFH would be short term, minor and localized to the areas of pier pilings. As per requirements in Section 305(b) of the Magnuson-Stevens Fishery Conservation and Management Act, the Mississippi Trustee has notified NOAA Marine Fisheries of action that may adversely affect EFH, and has further provided an EFH assessment to NOAA Marine Fisheries. Essential Fish Habitat (EFH) consultation was completed with NMFS's Southeast Regional Office's Habitat Conservation Division (SERO HCD); (Fay, 2014). NMFS concurred with the EFH assessment that the project may result in

minimal and temporary impacts to EFH, and no EFH conservation recommendations were provided pursuant to Section 305(b)(2) of the Magnuson-Stevens Act at this time. Further consultation is not necessary unless future modifications are proposed and such actions may result in adverse impacts to EFH. Under the notification the Trustee stated that the following BMPs would be adhered to:

- Anchoring and mooring will be restricted to impacted areas. Work barges would be moored for overnight and weekends/holidays in areas where previous impacts have occurred (deployment areas).
- Vibratory hammers are considered a minimization measure to decrease injury and behavior modification to fish and cetaceans. The project will use this method to install pilings for piers.
- Monitoring will be conducted before, during, and after project implementation to ensure compliance with project design.
- Structures will be designed to minimize shading impact to tidal and non-tidal wetland grasses.
- Appropriate BMPs will be employed to minimize impacts associated with the parking areas and during construction.

10.7.6.7 Invasive Species

Affected Resources

The potential introduction of terrestrial and aquatic non-native invasive species of plants, animals, and microbes is a concern for any proposed project. Non-native invasive species could alter existing terrestrial or aquatic ecosystems, may cause economic damages and losses, and are frequently the second most common reason for protecting species under the Endangered Species Act. The species that are or may become introduced, established, and invasive are difficult to identify. The analysis focuses on pathway control or actions/mechanisms that may be taken or implemented to prevent the spread of invasive species on site or introduction of species to the site.

The following plant species are listed as invasive in Mississippi: alligator weed (*Alternanthera philoxeroides*), cogongrass (*Imperata cylindrical*), common salvinia (*Salvinia minima*), Eurasian watermilfoil (*Myriophyllum spicatum*), giant salvinia (*Salvinia molesta*), kudzu (*Pueraria lobata*), Chinese tallow tree (*Sapium sebiferum*), torpedo grass (*Panicum repens*), and water hyacinth (*Eichornia* spp.) (MDMR 2013). Much of the uplands within the project area are disturbed habitats where several invasive species are found. These include cogongrass and Chinese tallow. Invasive aquatic fauna reported in the area include Asian tiger shrimp (*Penaeus monodon*), and Nile tilapia (*Oreochromis niloticus*).

Environmental Consequences

BMPs to prevent the spread of invasive species through common pathways will be implemented thereby minimizing the potential for short and long-term adverse impacts from the proposed project. This project involves the construction of boardwalks, an interpretive center, a bait shop/kayak rental facility, shoreline stabilization, and trails. A variety of construction equipment (both in-water and on land) will be used. Each of these actions and pieces of equipment serve as a potential pathway to introduce or spread invasive species. To ensure these pathways are “broken” and do not spread or introduce species the following BMPs will be implemented: all equipment to be used during the project, including personal gear, will be inspected and cleaned such that there is no observable presence of mud, seeds,

vegetation, insects, and other species. During operation and management of the facilities, native vegetation will be used for planting. Prior to bringing vegetation to the site, the vegetation will be inspected and "non-target[10]" species will be removed. The implementation of these BMPs meets the spirit and intent of EO 13112. Due to the implementation of BMPs, the Trustees expect risk from invasive species introduction and spread to be short term and minor.

10.7.6.8 Human Uses and Socioeconomics

Socioeconomics and Environmental Justice

Affected Resources

Socioeconomic resources combine the social resources and economic resources of the area. The social resources evaluation includes consideration such as potential changes in neighborhoods or community cohesion; affordable housing; changes in travel patterns and accessibility; impacts on community facilities; impacts on traffic safety/public safety; and impacts on any special groups such as elderly, handicapped, minority, and transit-dependent persons. The data in this section was compiled using the Census and American Factfinder websites (U.S. Census Bureau 2011 and 2012).

The project is located in the northern part of the City of Biloxi (Census Tract 33.04) in southern Harrison County, Mississippi. In 2010, Harrison County had a population of 187,105 with a mostly white (70 percent) and black or African American (22 percent) racial composition (Table 10-29). The City of Biloxi had a population of 44,054 with a similar racial composition, although the Asian population was higher (4.4 percent) percentage-wise than Harrison County (2.8%). Harrison County Census Tract 33.04 had a population of 4,233, also with a similar racial composition.

The 2007 Economic Census collected data on various industries including those operating in Harrison County and the City of Biloxi (U.S. Census Bureau 2011b). The following list reports industries within Harrison County and the employer value of sales, shipments, receipts, revenue, or business done in thousands of dollars. (Note: In the lists below, N means "not available or not comparable" and D means "withheld to avoid disclosing data for individual companies; data area included in higher level totals.")

- Manufacturing (D)
- Wholesale trade (839,746)
- Retail trade (2,903,219)
- Information (D)
- Real estate and rental and leasing (175,579)
- Professional, scientific, and technical services (D)
- Administrative and support and waste management and remediation services (199,219)
- Educational services (D)
- Health care and social assistance (1,498,878)
- Arts, entertainment, and recreation (D)
- Accommodation and food services (1,619,113)
- Other services except public administration (181,349)

[10] A non-target species is any species that is present on the species of choice but is not desirable and should be removed.

Table 10-29. Demographics of the project area in 2010 (U.S. Census Bureau 2011a).

	HARRISON COUNTY	CITY OF BILOXI	CENSUS TRACT 33.04, HARRISON COUNTY
Total Population	187,105	44,054	4,233
Race			
White alone	130,366 (70%)	30,129 (68%)	3,320 (78%)
Black or African American alone	41,393 (22%)	8,632 (20%)	550 (13%)
American Indian or Alaska Native alone	863 (0.5%)	221 (0.5%)	22 (0.5%)
Asian alone	5,322 (2.8%)	1,951 (4.4%)	171 (4.0%)
Native Hawaiian and Other Pacific Islander alone	263 (0.1%)	108 (0.2%)	5 (0.1%)
Some Other Race alone	3,911 (2.1%)	1,662 (3.8%)	61 (1.4%)
Two or More Races	4,987 (2.7%)	1,351 (3.1%)	104 (2.4%)
Hispanic or Latino	9,937 (5.3%)	3,847 (8.7%)	161 (3.8%)
Not Hispanic or Latino	177,168 (94.7%)	40,207 (91.3%)	4,072 (96.2%)

The following list reports industries within the City of Biloxi and the employer value of sales, shipments, receipts, revenue, or business done in thousands of dollars.

- Wholesale trade (160,552)
- Retail trade (573,389)
- Information (N)
- Real estate and rental and leasing (58,502)
- Professional, scientific, and technical services (D)
- Administrative and support and waste management and remediation services (30,136)
- Educational services (D)
- Health care and social assistance (799,482)
- Arts, entertainment, and recreation (D)
- Accommodation and food services (1,247,079)
- Other services except public administration (34,961)

Table 10-30 lists employment information for Harrison County, the City of Biloxi, and Harrison County Census Tract 33.04. The top five industries in Harrison County in terms of employment are educational services, and health care and social assistance (18.5 percent); arts, entertainment, and recreation, and accommodation and food services (17 percent); retail trade (12 percent); construction (9.7 percent); and public administration (7.9 percent). The percentage of civilian labor force unemployed in Harrison County is 5.7 percent. The median household income is $38,645 and the per capita income is $21,001. Data for the City of Biloxi and Census Tract 33.04 are generally similar, although the household income in Census Tract 33.04 is considerably higher ($38,315) and unemployment is lower (3.6 percent).

Biloxi police and fire departments and emergency medical services have access to the Popp's Ferry Causeway Park along Causeway Drive. The nearest medical facility, Cedar Lake Medical Park and Surgery Center, is located approximately 3.8 miles northeast of the proposed park. Biloxi Fire Department District 6 serves the proposed project location and the Biloxi Police Department has a location on Popp's Ferry Road. Local law enforcement currently patrols the park. Parks and recreation areas other than the

proposed project include Camp Wilkes on the Back Bay to the east, the Biloxi Sports Complex to the northeast, and the Popp's Ferry Recreational Area and Sunkist Country Club to the north.

Table 10-30. Selected economic characteristics of the project area.

	HARRISON COUNTY	CITY OF BILOXI	CENSUS TRACT 33.04, HARRISON COUNTY
Industry (civilian employed population 16 years and over)	**83,694**	**20,233**	**2,437**
Agriculture, forestry, fishing and hunting, and mining	737 (0.9%)	372 (1.8%)	27 (1.1%)
Construction	8,093 (9.7%)	1,600 (7.9%)	69 (2.8%)
Manufacturing	5,867 (7.0%)	1,171 (5.8%)	12 (0.5%)
Wholesale trade	2,277 (2.7%)	552 (2.7%)	90 (3.7%)
Retail trade	10,345 (12%)	2,602 (13%)	109 (4.5%)
Transportation and warehousing, and utilities	3,488 (4.2%)	610 (3.0%)	22 (0.9%)
Information	1,366 (1.6%)	521 (2.6%)	0 (0.0%)
Finance and insurance, and real estate and rental and leasing	6,023 (7.2%)	969 (4.8%)	235 (9.6%)
Professional, scientific, and management, and administrative and waste management services	5,709 (6.8%)	1,356 (6.7%)	351 (14%)
Educational services, and health care and social assistance	15,458 (19%)	3,148 (16%)	479 (20%)
Arts, entertainment, and recreation, and accommodation and food services	13,845 (17%)	4,435 (22%)	591 (24%)
Other services, except public administration	3,875 (4.6%)	980 (4.8%)	121 (5.0%)
Public administration	6,611 (7.9%)	1,917 (9.5%)	331 (14%)
% unemployed, civilian labor force	5.7%	4.4%	3.6%
Median household income (dollars)	38,645	41,655	66,117
Per capita income (dollars)	21,001	24,488	38,315
Percentage of all People whose income in the past 12 months is below the poverty line	20.3%	19.6%	4.7%

Environmental Consequences

Socioeconomic

The project would provide work for construction-related industries for the construction timeframe. The operation of the bait shop/concession stand/kayak rental facility would create four to five jobs. Additionally, the improved access, environmental education, and creation of recreational facilities, especially the provision of fishing locations for those without boats, would benefit the local community. Short-term and long-term benefits would result from construction jobs and jobs at the Popp's Ferry Causeway Park.

Environmental Justice

The project would provide additional recreational opportunities in the Popp's Ferry Causeway Park and vicinity and is located in Back Bay away from residential developments. There would be no disproportionate impacts to minority or low-income populations.

10.7.6.9 Cultural Resources

Affected Resources

The National Historic Preservation Act of 1966 (NHPA) charges the federal government with considering the potential effects of its actions on the nation's cultural and historic resources. Much of the southern portion of the project area, while undeveloped, has been disturbed at some point in the past. Dating back to the late 1800s, the southern end of the project site was used as a ferry landing transporting people, livestock, and vehicles across Big Lake to Biloxi. A Phase I cultural and archeological inventory was completed for the project area (R. Christopher Goodwin and Associates, 2014). Investigation of previously recorded site locations on file with the Mississippi Department of Archives and History (MDAH) and based on the results of field surveys, there are no identified archaeological, prehistoric or historic sites, or historic standing structures that are listed on the NRHP, or designated National Historic Landmarks within the project area. No further study is the recommendation of the Phase I report.

This project is currently being reviewed under Section 106 of the NHPA to identify any historic properties located within the project area and to evaluate whether the project would affect any historic properties.

Environmental Consequences

A complete review of this project under Section 106 of the NHPA is ongoing and would be completed prior to any project activities that would restrict consideration of measures to avoid, minimize or mitigate any adverse effects on historic properties located within the project area. This project would be implemented in accordance with all applicable laws and regulations concerning the protection of cultural and historic resources.

10.7.6.10 Infrastructure

Affected Resources

Within the project area, there is only one roadway, the two-lane Causeway Drive. This roadway connects the mainland neighborhood to Popp's Ferry Causeway Park by crossing Burnt Bridge and terminates at the southern point of the park. The main arterial road adjacent to the project area is Popp's Ferry Road/Bridge, which connects North Biloxi to the Biloxi peninsula. The City of Biloxi Comprehensive Plan reports that the 2007 average daily traffic on the section of Popp's Ferry Road that runs along Causeway Park is 22,000 vehicles with a year 2030 projection of 24,900 vehicles. No traffic estimates exist for Causeway Drive, although traffic volume is low. A multi-use (i.e., biking and walking) path has been suggested for Popp's Ferry Road and a proposed shared route connecting the Biloxi Sports Complex to the neighborhood north of the Popp's Ferry Causeway Park (City of Biloxi 2009). Currently, there is no public transportation serving the project area; however, bus service has been proposed for Popp's Ferry Road (City of Biloxi 2009).

Electric utility lines run most of the length of the project site and feed existing lighting facilities along Causeway Drive. There is a sewer force main within the project area, although there are no sewer or solid waste utilities for use at the site. No water supply is present and no oil or natural gas wells are present.

Environmental Consequences

Enhancement of the project area would result in increased parking and access to the fishing, picnicking, and educational facilities. Increased capacity could result in an increased volume of visitors, thereby increasing vehicular and boat traffic associated with the site. Along with improvements to the surface of Causeway Drive, additional lighting would be installed for the road and parking areas. Wastewater and water utilities connections would be installed to provide restroom facilities and potable water. Existing utilities may need to be shut down for very brief periods while utilities are connected, but no adverse impacts would be expected.

There would be no impacts to infrastructure as a result of the project. The installation of new wastewater and water utilities in the area would be a long-term benefit resulting from the project.

10.7.6.11 Land and Marine Management

Affected Resources

According to the City of Biloxi zoning map, the current zoning for the project area is neighborhood business (NB) and RS-10 Single-Family Residential, Low Density (RS-10) (City of Biloxi 2010). NB is a non-residential district zoned to provide small-scale and low-intensity goods and services (e.g., recreational facilities, small restaurants, convenience stores, libraries, schools) for adjacent neighborhoods that do not increase traffic (City of Biloxi 2013). RS-10 intended to provide for residential housing needs but it is also zoned to provide open space and recreational needs and complimentary public land uses (City of Biloxi 2013). The City of Biloxi Comprehensive Plan predicts that the future land use for the entire Popp's Ferry Causeway Park area would be parks, recreation, and environmental open space.

The main portion of the project area is designated as parks and recreation land use by the City of Biloxi Comprehensive Plan (City of Biloxi 2009). The project area north of the boat launch facility, including the estuarine marsh adjacent to Causeway Drive, is classified as undeveloped, vacant land, or vacant building. Institutional or government land use is also present and adjacent to the project area in the northeast. Surrounding Causeway Drive at the northern point of the project area is single-family residential land use. The waters of Big Lake/Biloxi River along the western boundary of the Popp's Ferry Causeway Park are part of the Biloxi River Marshes Preserve within the Mississippi Coastal Preserves system. These waters are also part of the Biloxi River navigation channel and support regular barge traffic.

Environmental Consequences

The proposed project elements are consistent with current and future zoning and land use plans for the area. The majority of the project area is designated as park, recreational land, and open land. The construction and operation of the Popp's Ferry Causeway Park project would improve the park and recreational features of the area and highlight ecological features. Pursuant to the CZMA 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. The project is consistent with current land use plans and would provide a long-term benefit to land and marine management in the area.

10.7.6.12 Aesthetics and Visual Resources

Affected Resources

Aesthetics and visual resources of the project area consist of viewsheds of natural and developed environments. The natural areas include the estuarine wetlands and disturbed upland habitats of the causeway as well as the open water areas visible from the project footprint including the waters of Biloxi River, Big Lake, and the Back Bay of Biloxi. Although the southern portion of the park is mainly undeveloped, it has experienced a large degree of human disturbance. A two-lane unimproved roadway runs the length of the western causeway from north to south. In addition, there is a non-vegetated dirt and gravel open area at the very southern end of the site adjacent to the road. North and east of the road, a rutted dirt track makes a loop through an upland area. Sparsely interspersed through this area are trees, shrubs, and grasses. Most of the trees on the site are located north of the upland area and separate the disturbed uplands from the emergent marsh further to the north. Both project site visitors as well as commuters on the Popp's Ferry Bridge are able to see these visual resources. Man-made visual resources consisting of urban development features that are visible from the project footprint include the Popp's Ferry Bridge to the east and small portions of residential land both north and south of the causeway. When viewing outward from the southern part of the site, park visitors can see these urban visual resources. The bridge is very close to the southern project area; depending on the viewer's location in this area, the bridge is anywhere from 0 to 650 ft. away. In the southernmost section of Popp's Ferry Causeway Park, the outward viewshed consists mostly of open water with residential land at least 750 ft. to the south.

The northern portion of the project area encompasses the proposed utility connection work that runs north along Causeway Drive, across to the mainland ending at the residential street, Cambridge Drive. The viewshed here consists of an improved two-lane roadway, a concrete walkway along the western side, a parking lot for cars and boat trailers, a fishing pier, and a marsh boardwalk. A residential area is visible at the far northern end. In addition to the artificial resources described above, most of the outward viewshed consists of open water areas and emergent estuarine marsh.

Environmental Consequences

During construction, there would be temporary aesthetic and visual resource impacts due to the presence and use of construction equipment as well as the disrupted and disturbed state of the site before the completion of each project feature. Currently, the site is used for fishing, boating, and walking. The presence of the construction equipment and disturbed site would be apparent and could detract from the nature viewing experience of some visitors. Additionally, large equipment and areas of disturbed ground might be visible to people passing through adjacent areas such as Popp's Ferry Bridge or the surrounding waters and residential neighborhoods. Therefore, construction activities would result in short-term, minor adverse impacts to aesthetic and visual resources.

Following construction, there would be long-term beneficial aesthetic and visual resource impacts due to the presence of the various project features. The shoreline stabilization would use rock riprap. The benefits from this stabilization would outweigh potential adverse impacts to aesthetics and visual resources. Other installed features (Interpretive Center, bait shop/concession stand/kayak rental facility, fishing piers, walkways, marsh overlook pier, etc.) would change the visual character of the disturbed site to a park environment. In addition to providing opportunities and visitor enjoyment, these facilities would be considered beneficial to aesthetics and visual resources.

Short-term minor adverse impacts to visual resources would occur during construction. Long-term beneficial impacts to aesthetics and visual resources would result from park implementation.

10.7.6.13 Tourism and Recreational Use

Affected Resources

The proposed project site currently includes infrastructure for public access and recreation. Access to the site is provided by a two-lane roadway entering the park at Burnt Bridge. The northern portion of this road was recently repaved and lighting was installed. The southern portion is paved but needs repair and improved lighting. Adjacent to the terminus of the improved road is a parking lot for at least ten cars and ten boat trailers. At the southernmost portion of the project area is a gravel and dirt area currently available for parking. A lighted concrete promenade with benches runs along the western side of the causeway and terminates at a boat launch facility, which would provide access to shoreline opportunities and the surrounding waters. A wooden fishing pier provides additional access to coastal habitats and recreational pursuits. An extensive walkway over marsh and estuarine waters allows access to wetland vistas. The public can access the Popp's Ferry Causeway Park and its existing facilities 24 hours a day.

No visitation numbers are available for the Popp's Ferry Causeway Park. However, anecdotal evidence shows that it is a popular spot for outdoor activities by local residents. Visitors use the fishing piers, Burnt Bridge, and shoreline locations for fishing, crabbing, and shrimping. The boat launch provides boaters accessibility to the waters surrounding the park. Walking, running, and nature viewing are possible throughout the park including on the lighted concrete walkway, the marsh boardwalk, and other areas in the southern portion.

Environmental Consequences

Due to safety concerns, access to certain areas may be restricted during construction of each project feature. These restrictions would be limited to the vicinity of construction of specific project features and during the construction period only. Other parts of the park could still be accessed during construction.

After construction is complete, the project would increase the recreational opportunities on the park lands and in the surrounding waters. In addition, completion of the project would allow for easier access to the park and its existing and new recreational features. Almost all areas of the park would be open to recreational pursuits through the nature trails and picnic areas, marsh overlook pier, concrete shoreline walkway, and improvements to the southern part of Causeway Drive. The addition of the bait shop/concession stand/kayak rental facility would allow visitors to use kayaks to explore the nearby shallow water estuarine areas adjacent to the park; previously, these areas were not easily accessible for recreation. The additional fishing piers would allow for more visitors to fish and crab in local waters, especially for those without boat access.

Construction activities would result in short-term minor adverse impacts to public access and recreation. Following construction, there would be long-term beneficial impacts to public access and recreation within the park and adjacent areas.

10.7.6.14 Public Health and Safety

Affected Resources

Riprap water edge treatment protects the western side of the project area. The northern portion of riprap has been enhanced, but the southern area of riprap is older and needs replacement.

Environmental Consequences

There are no anticipated impacts to public health and safety due to construction or operation of the project. The improvement to, and addition of, riprap water edge treatment would result in long-term beneficial impacts to shoreline protection for the localized western boundary of the Popp's Ferry Causeway Park.

10.7.7 Summary and Next Steps

The project is intended to restore lost recreational opportunities through the enhancement of increased access to coastal estuarine habitats and wildlife viewing areas. The project would enhance the public's use and/or enjoyment of natural resources by constructing and/or expanding an educational interpretive center, nature trails, piers, and other recreational enhancements that would enhance visitor access to the adjacent coastal estuarine environment and provide opportunities for visitors to fish, crab, and observe nature. The project is consistent with Alternative 3 (Contribute to Providing and Enhancing Recreational Opportunities) and Alternative 4 (Preferred Alternative).

NEPA analysis of the environmental consequences suggests that while there may be minor adverse impacts to some resource categories, there would be no long-term major adverse impacts as a result of the project. The project would provide long-term benefits by providing enhanced access to coastal resources and educational opportunities in the park, fishing piers, boardwalks, a marsh overlook, and interpretive center. The Trustees have completed coordination and reviews under the Endangered Species Act, the Migratory Bird Treaty Act, the Bald and Golden Eagle Protection Act and the Marine Mammal Protection Act. Consistency reviews of the proposed Phase III early restoration projects in Mississippi were initiated by the Federal Trustees under the Coastal Zone Management Act and have been completed. The Trustees have initiated consultations under the Historic Preservation Act and other federal statutes. The Trustees will consider public comment and information relevant to environmental concerns bearing on the proposed actions or their impacts. Trustees' determination on selection of this project will be included in the Record of Decision.

Throughout the design process, every practical attempt would be made to avoid and minimize potentially adverse environmental, social, and cultural impacts. The following BMPs and conservation measures that (sorted by resource type) would be utilized to minimize impacts to resources:

- Geology and Substrates
    - Construction in Mississippi is required to follow the "Erosion Control, Sediment Control and Stormwater Management on Construction Sites and Urban Areas"(MDEQ 2012a) and the "Field Manual for Erosion and Sediment Control on Construction Sites in Mississippi" (MDEQ 2005).
- Hydrology and Water Quality
    - To the extent possible, pervious, vegetated treatment areas would be incorporated into the final design to facilitate stormwater storage and treatment throughout the site.

    - The marsh boardwalk would be constructed to allow sunlight to penetrate through, reducing shading effects and allow vegetation to regrow.
    - Construction in Mississippi is required to follow the “Erosion Control, Sediment Control and Stormwater Management on Construction Sites and Urban Areas”(MDEQ 2012a) and the “Field Manual for Erosion and Sediment Control on Construction Sites in Mississippi” (MDEQ 2005).
    - Contractors would be instructed to avoid the clearing of trees and minimize disturbance and compaction in wetlands.
- Green House Gas Emissions
    - Shut down idling construction equipment, if feasible.
    - Locate staging areas as close to construction sites as practicable to minimize driving distances between staging areas and construction sites.
    - Encourage the use of the proper size of equipment for the job to maximize energy efficiency.
    - Encourage the use of alternative fuels or power sources for generators at construction sites, such as propane or solar power, or use electrical power where practicable.
- Noise
    - Piling driving will be completed with a vibratory hammer, which would minimize noise impacts.
    - Every effort would be made to minimize the time required for pile installation.
    - All vessels associated with the construction project shall operate at “no wake/idle” speeds at all times and in all water depths where the draft of the vessel provides less than a 4-ft. clearance from the bottom.
    - Construction contractors would preferentially follow deep-water routes (e.g., marked channels) whenever possible.
    - If marine mammals are seen, all work (pile driving) would cease until the animal has left the project area.
    - The Trustee, or designee, would have monitors onsite during pile installation to ensure that these conditions are met.
- Flora and Fauna
    - Construction of the boardwalk to allow penetration by sunlight would reduce shading effects and allow vegetation to regrow.
    - The Trustee would identify and also avoid pocket beaches to the maximum extent practicable in the design of the project.
- Marine Mammals
    - Establishment of Shut-Down Zone: The calculated radius for the 120 dB rms/Level B harassment zone (i.e., distance from driven pile to area where harassment would no longer be expected to occur) is 1,585 m. The area defined by this radius in all relevant directions from the pile driving activity will comprise the shut-down zone. Shut-down of pile driving activity would occur immediately upon observation of any marine mammal within or approaching this zone.
    - Visual Monitoring and Shut-down of Pile Driving Activities: The shut-down zone will include all areas where underwater sound pressure levels are anticipated to equal or exceed the 120 dB threshold, as described under "Establishment of Shut-Down Zone."

Qualified observers will monitor these zones and advise project personnel when delay or shut-down of pile driving activities is required. The shut-down zone will be monitored for the presence of marine mammals before, during, and after any pile installation activity, beginning 15 minutes prior to initiating the start of pile installation and continuing for 15 minutes following the completion of pile installation. If marine mammals are present within the shut-down zone prior to pile installation, the start of pile installation will be delayed until the animals voluntarily leave the shut-down zone and have been visually confirmed beyond the zone, or until 15 minutes have elapsed without redetection. Shutdown of pile driving activities will occur if any marine mammal enters or approaches the established zone, and will not resume until the animal has voluntarily moved beyond the relevant shut-down zone radius, either through visual confirmation or by waiting until 15 minutes has elapsed without redetection.

  - Qualified biologists will be present on site at all times during pile driving activities. The action area will be monitored by at least three observers during vibratory pile driving. One will be based on land; two will be on vessels traveling along and within the radius while visually scanning the area.
  - Monitoring of the shut-down zone will be conducted using binoculars, spotting scopes and visual observations. Each monitor will have a radio for contact with other monitors or work crews. A GPS unit, range finder, or other suitable methodology will be used for determining the observation location and distance to marine mammals, vessels, and construction equipment.
  - No pile driving will occur in low-light conditions, or when visibility is impaired such that the shut-down zone cannot be effectively monitored. Pile driving will only be conducted between one-hour post-sunrise through one hour prior to sunset. If waters exceed small craft advisories or conditions otherwise restrict biologists' ability to make observations or become unsafe for the observation boat to operate, pile installation will cease until conditions allow for monitoring to resume.

- Protected Species
  - If possible, complete the in-water work when manatees are not expected to be present, i.e., when water temperatures are below 68F. If timing restrictions are not feasible, then conditions A-D of the Standard Manatee Conditions for In-water Work, 2011, shall be followed when operating vessels or doing in-water work construction.
  - If protected species enter the construction area, construction would be halted until the individual(s) leave the project area.
- Migratory Birds
  - If activities require tree removal pre-construction surveys will be completed. If evidence of nesting is found, coordination with the USFWS would be initiated to develop and implement appropriate conservation measures.
- Essential Fish Habitat
  - Anchoring and mooring will be restricted to impacted areas. Work barges would be moored for overnight and weekends/holidays in areas where previous impacts have occurred (deployment areas).

    - Vibratory hammers are considered a minimization measure to decrease injury and behavior modification to fish and cetaceans. The project will use this method to install pilings for piers.
    - Monitoring will be conducted before, during, and after project implementation to ensure compliance with project design.
    - Structures will be designed to minimize shading impact to tidal and non-tidal wetland grasses.
    - Appropriate BMPs will be employed to minimize impacts associated with the parking areas and during construction.
- Invasive Species
    - All non-native species removed during clearing and grubbing would be properly handled to prevent spreading into other areas on the project site. Proper handling could include bagging, mulching, or burning removed vegetation to prevent regrowth.
- Tourism and Recreational Use
    - Access to certain areas may be restricted during construction of each project feature.

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10.8 Pascagoula Beachfront Promenade: Project Description

10.8.1 Project Summary

The proposed Pascagoula Beachfront Promenade project is intended to restore lost recreational opportunities resulting from the Spill and related response actions. This project would enhance recreational shoreline access via the construction of a lighted concrete beachfront pedestrian pathway adjacent to a sand beach in Pascagoula, Mississippi. Project funds would be used to help complete a two-mile, 10-ft.-wide lighted concrete pathway complete with amenities. This Early Restoration project proposal would fund a portion (8,200 ft.) of the 10-ft. wide promenade, a portion of which has already been constructed. The estimated cost for this project is $3,800,000.

10.8.2 Background and Project Description

The Pascagoula Beachfront Promenade project is located immediately south of and parallel to Beach Boulevard in Pascagoula, Mississippi, in Jackson County, and would extend approximately 8,200 ft. from Point Park on the western end to the eastern edge of the drainage channel east of Oliver Street (Figure 10-13). It is immediately adjacent to a sand beach on the Mississippi Sound, which was oiled during the Spill. In addition to the promenade, amenities may be constructed as funding allows (e.g., fire pits, playgrounds, volleyball courts, public art, parking, and shower stations). The promenade would be constructed from the southern edge of the curb on Beach Boulevard and extend over the sand beach, which was recently funded through a U.S. Army Corps of Engineers' $12 million seawall protection ("beach creation") project (Figure 10-14). Figure 10-15, Figure 10-16, and Figure 10-17 show the master plan for the entire project, including Early Restoration -funded project elements and elements of the project funded by other sources.

Figure 10-13. The Pascagoula Beachfront Promenade project segments.

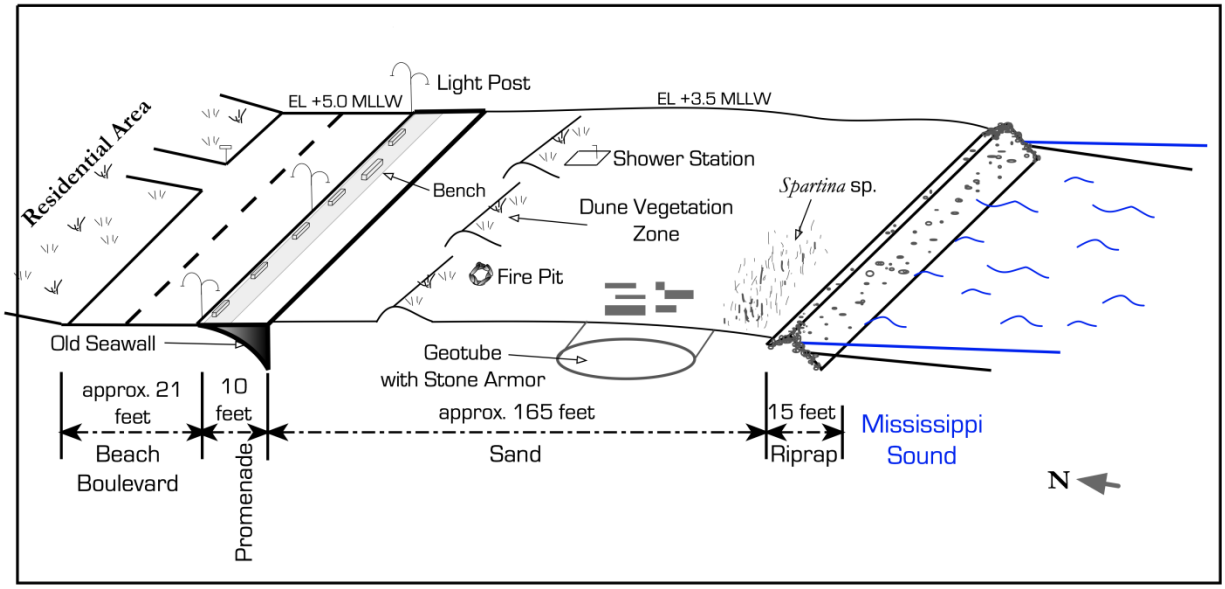

Figure 10-14. Conceptual Diagram—Pascagoula Beachfront Promenade project.

Figure 10-15. Pascagoula Beachfront Promenade Master Plan proposed western beachfront (the western end of the proposed promenade is flagged by the red arrow).

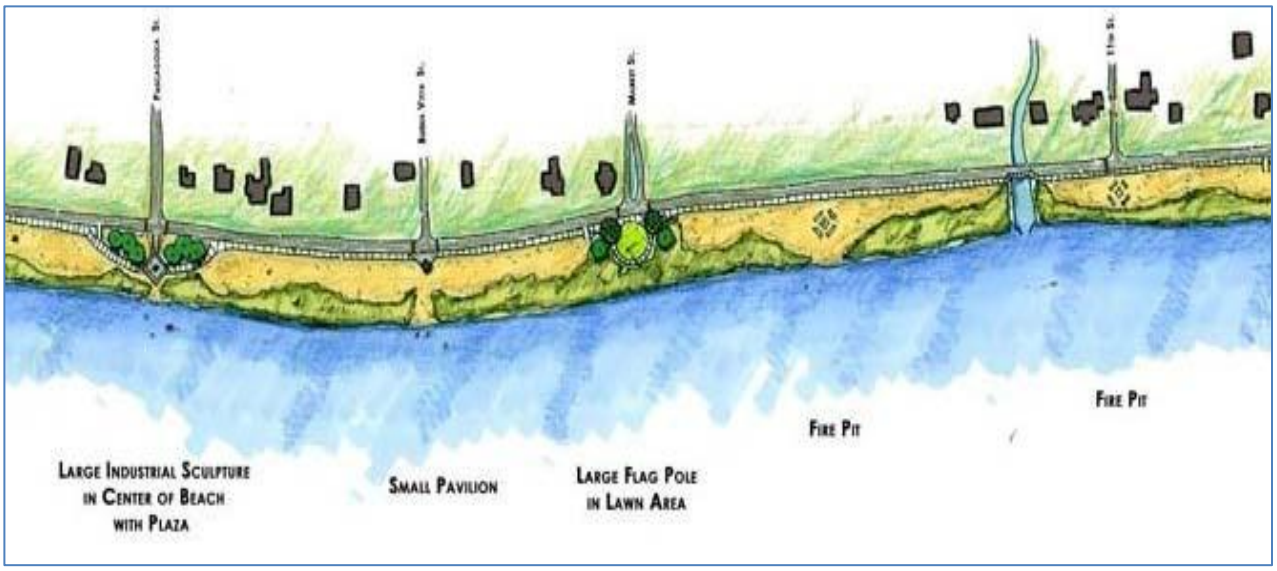

Figure 10-16. Pascagoula Beachfront Promenade Master Plan.

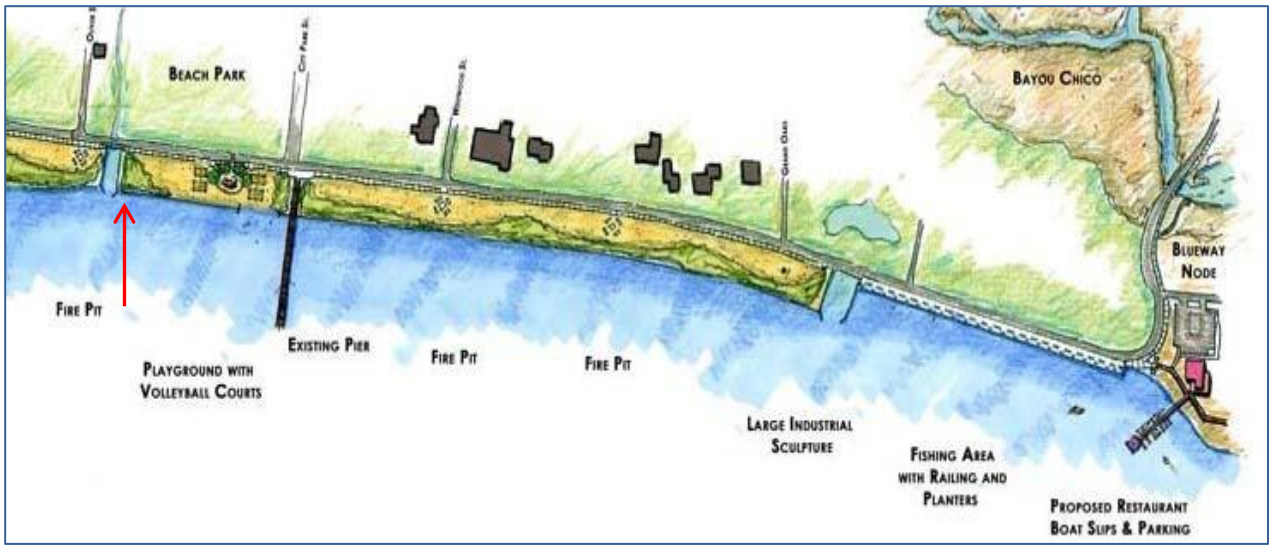

Figure 10-17. Pascagoula Beachfront Promenade Master Plan.

10.8.3 Evaluation Criteria

This project meets the evaluation criteria established in the Oil Pollution Act (OPA) and the Framework Agreement. As a result of the Spill, the public's access to and enjoyment of the natural resources along the Mississippi Gulf Coast were denied or severely restricted. Completion of the project would enhance the public's use and/or enjoyment of natural resources, specifically, shoreline adjacent to the Mississippi Sound (Section 7.1; Table 7.1). The project is intended to replace or provide recreational opportunities comparable to the types of opportunities lost as a result of the Spill. The nexus to resources injured by the Spill is clear (see C.F.R. § 990.54(a) (2) and Sections 6a-6c of the Early Restoration Framework Agreement). Since the project is technically feasible, utilizes proven techniques with established methods and documented results, and would be appropriately monitored and managed, it can be implemented with minimal delay. Similar projects have been successfully implemented in the region. For these reasons, the project has a high likelihood of success (see C.F.R. § 990.54(a)(1) and (3) and Section 6e of the Early Restoration Framework Agreement). A thorough environmental review, including review under applicable environmental statutes and regulations, as described in section 10.9, indicates that adverse effects from the project would largely be minor, localized, and often of short duration. In addition, the best management practices and measures to avoid or minimize adverse effects described in 10.9 would be implemented. As a result, collateral injury would be avoided and minimized during project implementation (construction and installation and operations and maintenance) (15 C.F.R. § 990.54(a)(4)). Cost estimates are based on similar past projects, and the project can be conducted at a reasonable cost (see C.F.R. § 990.54(a)(1)). This project was included in the *Mississippi Coastal Improvements Program (MsCIP): Hancock, Harrison, and Jackson Counties, MS – Interim Report* and is consistent with existing and long-term local restoration needs and initiatives (see Section 6(d) of the Early Restoration Framework Agreement). Further, this project would not adversely affect public health and safety (see Section 3.3.6 Public Health and Safety).

10.8.4 Performance Criteria, Monitoring and Maintenance

Successful completion of the project would meet the restoration objective to enhance public use and enjoyment of the natural resources injured by the Spill. This project includes monitoring efforts to ensure project designs are correctly implemented during construction. Trustees would conduct additional monitoring for public use of the Pascagoula Beachfront Promenade and the adjacent beach area through visitor counts on the promenade and associated amenities for a five [year period upon completion of construction. The City of Pascagoula would be responsible for maintenance of the project facilities, features, and exhibits.

10.8.5 Offsets

NRD Offsets are $5,700,000 expressed in present-value 2013 dollars, based on a benefit-to-cost ratio of 1.5, to be applied against the monetized value of lost recreational use provided by natural resources injured in Mississippi, which would be determined by the Trustees' assessment of lost recreational use for the Spill. Please see Chapter 7 of this document (Section 7.2.2) for a description of the methodology used to develop monetized Offsets.[11]

10.8.6 Cost

The total estimated cost to implement this project is $3,800,000. This cost reflects current cost estimates developed from the most current information available to the Trustees at the time of the project negotiation. The cost includes provisions for planning, engineering and design, construction, monitoring, and potential contingencies.

[11] For the purposes of applying the NRD Offsets to the calculation of injury after the Trustees' assessment of lost recreational use for the Spill, the Trustees and BP agree as follows:

- The Trustees agree to restate the NRD Offsets in the present value year used in the Trustees' assessment of lost recreational use for the Spill.
- The discount rate and method used to restate the present value of the NRD Offsets will be the same as that used to express the present value of the damages.

10.9 Pascagoula Beachfront Promenade: Environmental Review

10.9.1 Introduction and Background

The proposed Pascagoula Beachfront Promenade project is intended to restore lost recreational opportunities resulting from the Spill and related response action, which severely restricted human activity for an extended period of time, including access to Pascagoula's beachfront recreation by local residents and regional visitors. Specifically, the project would enhance recreational shoreline access via the construction of a lighted concrete beachfront pedestrian pathway adjacent to a sand beach in Pascagoula, Mississippi. Early restoration funds would be used to help complete a portion of a two-mile, 10-ft.-wide lighted concrete pathway complete with amenities.

Previous NEPA/Early Restoration Funding: In 2011, the City of Pascagoula prepared an Environmental Assessment (EA) for the Department of Housing and Urban Development (HUD) for the Beachfront Promenade Project (HUD 2011) for a portion of the Pascagoula Beachfront Promenade project. The DOI regulations for implementing the National Environmental Policy Act (NEPA) provide that the Department of the Interior (DOI) may adopt an EA prepared by another agency (see 43 C.F.R. 46.320). See Section 7.8 for information on DOI NEPA adoption regulations and requirements. For the Proposed Action, DOI adopted the HUD EA entitled *"Environmental Assessment and Finding of No Significant Impact for HUD-funded Proposals, Pascagoula Beach Promenade Project"*; available at http://www.restore.ms.

The DOI regulations also provide that, when a proposed action differs from the proposed action contained in the adopted EA, DOI may augment the adopted EA to make it consistent with the proposed action (see 43 C.F.R. 46.320). This supplemental NEPA analysis augments the HUD EA. In addition to the environmental analysis regarding the construction of 10,500 linear ft. of concrete pedestrian pathway parallel to Beach Boulevard contained in the adopted HUD EA, this supplemental analysis considers any additional environmental impacts that would result from the elements of the Phase III Proposed Action that are not described and analyzed in the adopted HUD EA. These elements include an additional 500 ft. of concrete pathway at the upper reaches of the existing pathway on Pascagoula Beach and visitor amenities such a beach shower, a playground, benches and sculptures in the amenity area along 8,200 linear ft. of boardwalk (Figure 10-13).

The project description is based on the current design concept for the purpose of assessing the construction impact on the environment. Final engineering and project design could result in revisions to the project. The following description is intended to be a conservative review of the project components in order to evaluate a maximum environmental impact in the NEPA review and in environmental permitting. Project refinement(s) are anticipated as part of the design process. To the extent possible, revisions would be restricted to the current project footprint. For the purposes of this discussion, the project is divided into three segments (see Table 10-31).

Eastern Segment: A 2,800-linear-ft. segment from the eastern project terminus to Oliver Street; the segment is completed and was authorized by the HUD EA.

Middle Segment: A 7,700-linear-ft. segment from Oliver Street to the eastern terminus of Point Park (including amenities) that would be constructed using Early Restoration funds and was authorized by the 2011 HUD EA.

Western Segment: A 500-linear-ft. segment in the vicinity of Point Park that would be funded by Early Restoration and was not reviewed under the HUD EA.

Project Area: An 8,200-linear-ft. segment from Oliver Street to Point Park that is the Early Restoration project; funds would also be used to construct amenities and water tie ins.

The Early Restoration NEPA review adopts the 2011 HUD EA and focuses on a NEPA analysis of the western segment of the project that has not been reviewed. Funding would be used for the entire 8,200-linear-ft. project area, which includes the middle and western segments (Table 10-31).

Table 10-31. Early restoration and compliance for the Pascagoula Beach Promenade.

PROJECT AREA	LENGTH	NEPA REVIEW/PERMITTING	EARLY RESTORATION FUNDING
Eastern Portion	2,800 ft.	HUD EA/MCWPA permit	No
Middle Portion	7,700 ft.	HUD EA/MCWPA permit	Yes
Western Portion	500 ft.	No NEPA review/not authorized under MCWPA	Yes

MCWPA=Mississippi Coastal Wetland Protection Act Permit

The HUD EA covers the 10,500 linear ft. of the promenade (eastern and middle segments). The HUD EA does not cover the western 500 ft. of the promenade, utility tie-ins beneath Beach Boulevard at Buena Vista Street and Bernard Street, or amenities to be placed on the beach south of the Promenade pathway. The HUD EA's "Finding of No Significant Impact" (FONSI) indicates that the project would not result in significant negative impacts to the natural and human environment.

10.9.2 Project Location

The proposed project is located in the city of Pascagoula within the state of Mississippi, in Sections 6, 8 and 10; Township 8 South; Range 6 West, in Jackson County. The promenade would be located adjacent to the south of Beach Boulevard along the shore of the Mississippi Sound, bounded by Point Park to the west (Figure 10-17 and Figure 10-18).

The Pascagoula Promenade provides enhanced access via a promenade, which is positioned over the historic seawall along the shore (Figure 10-18). Project amenities may include, but are not limited to, lighting, shower stations, fire pits, pavilions and/or other items to be determined at final design. Amenities would be placed alongside the beachfront promenade as well as on the beach, which was recently restored by the U.S. Army Corps of Engineers as part of the $12 million Mississippi Coastal Improvements Program (MsCIP) Pascagoula Beach Boulevard Restoration Project (USACE 2009).

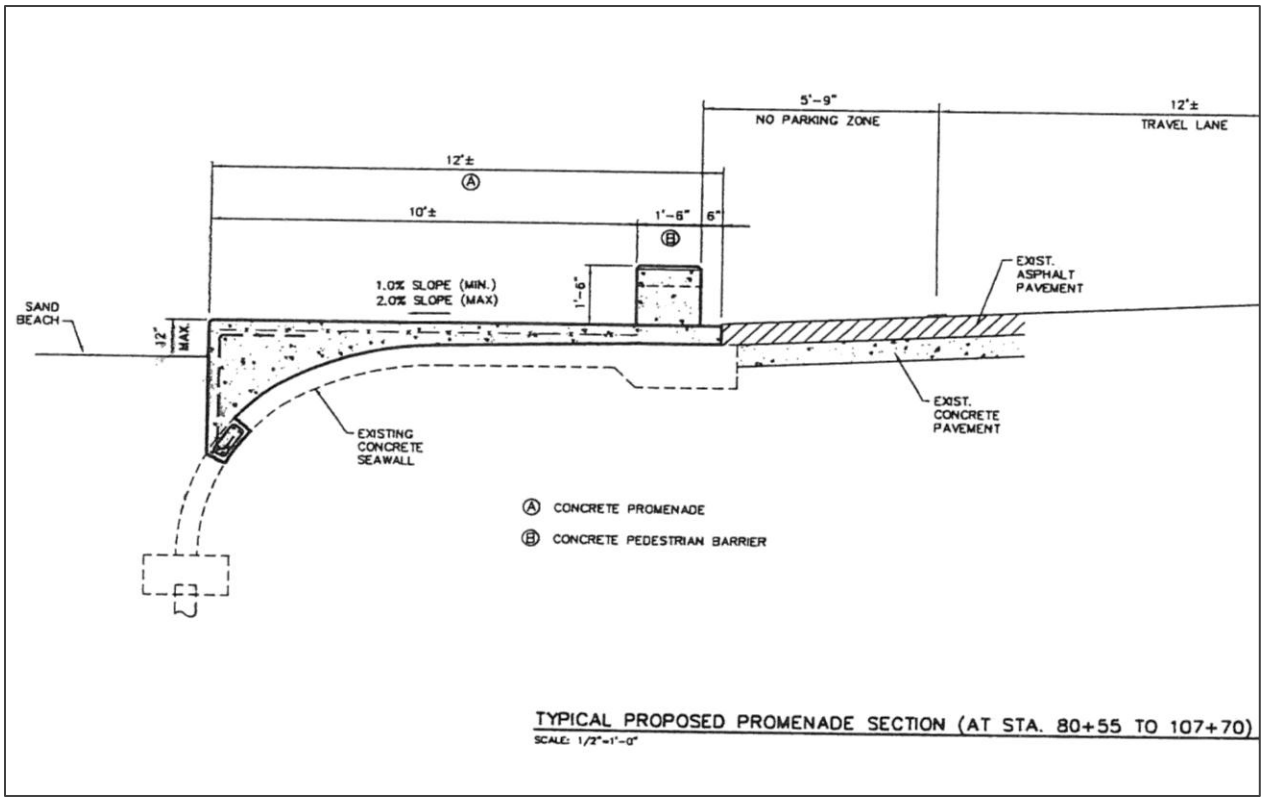

Figure 10-18. Cross-section of the proposed Pascagoula Beachfront Promenade.

The USACE's Pascagoula Beach Boulevard Restoration Project consisted of repair of the old seawall; replacement and extension of existing drainage structures; fill and placement of 7,700 ft. of geotubes; excavation of approximately 290,000 cubic yards of sand from the upper river portions of the Pascagoula federal navigation channel; placement of sand along 7,700 ft. of the Pascagoula waterfront in the Mississippi Sound; and beach toe protection consisting of the placement of Class 2 riprap at elevation -1 Mean Lower Low Water (MLLW) along the length of the project. The project also includes establishment of vegetation behind the riprap *(Spartina patens).* While the engineered purpose of this project is for storm protection of the seawall and Beach Boulevard, most residents refer to the area as the Pascagoula Beach ("beach"); Figure 10-18 and Figure 10-19.

Figure 10-19. Location of Pascagoula's beachfront and proposed project features.

10.9.3 Construction and Installation

Construction methods and activities are included in order to assess the impact on the environment. Actual construction methods and activities would be determined after final design and would likely be comparable to activities described below. It is expected that actual construction methods would be similar to those presented in this section.

Beachfront Promenade Structure and Amenities

The promenade would consist of concrete placed on top of an existing seawall, which is a feature currently covered in most places by sand (Figure 10-18). Two 60-ft.-long prefabricated pedestrian bridges would be installed to cross two existing drainage culverts (Figure 10-18). Tie-ins to existing water lines would be constructed along the north edge of Beach Boulevard at Bernard Street and Buena Vista Street. The promenade would contain concrete pedestrian barriers to provide a boundary between the concrete promenade and Beach Boulevard and would also serve as benches. The promenade would also include decorative light poles and fixtures.

Shower stations would be constructed at locations along the promenade in addition to other potential amenities positioned along the northern boundary of the beach (see Amenity Area in Figure 10-19). Construction activities would consist of removal of all existing low-mast lighting, the existing concrete

pedestrian 18-inch-by-18-inch barrier located on the southern edge of Beach Boulevard, excavation of sand to expose the existing seawall, the installation of required reinforcing steel and placement of concrete for the promenade structure walkway. New decorative light poles with associated fixtures and associated conduit would be installed, as well as pedestrian barriers/benches, bollards, and concrete pavers. Construction staging areas would include Point Park to the west, Beach Park to the east, the beach south of the construction site, and/or nearby leased private properties. Point Park is a disturbed area adjacent to an existing industrial shipyard, while Beach Park is a municipal park and recreation area with a public parking lot. Typical construction equipment consisting of small track-mounted mini-excavators, larger track-mounted full-sized excavators, rubber-tired backhoes, and track-mounted dozers would access the project area via Beach Boulevard and the sand beach.

After construction, parking for beach visitors would be available in Beach Park, Point Park, or along city streets in the neighborhoods adjacent to the north of Beach Boulevard.

Water Tie-ins

A directional bore perpendicular to Beach Boulevard would be made at both Bernard and Buena Vista Streets to install 6-inch High Density Poly Ethlylene (HDPE) water piping under the street to the south side of the new promenade walkway structure. Taps would be made to the existing city water main on the north side of Beach Boulevard, and the lines on the south side would be extended down the walkway for supply to the new shower locations.

Equipment to be used would include a small JD 410 backhoe or similar piece of equipment for miscellaneous grubbing and light excavation (locating and excavating for water taps), a directional boring machine similar to a Ditch Witch JT-30 that is track-mounted, and medium-sized over-the-road trucks for material handling and equipment delivery.

10.9.4 Best Management Practices

Throughout the design process, every practical attempt was made to avoid and minimize potentially adverse environmental, social, and cultural impacts. The BMPs and conservation measures that would be utilized to minimize impacts to resources are listed in Section 10.9.7, Summary and Next Steps.

10.9.5 Operations and Maintenance

The facility would be operated and maintained by the City of Pascagoula. Activities would include security, trash pickup and disposal, maintenance and repair of amenities, and repairs of structural elements.

The performance of the facility would be monitored over a period of five years to determine the number of visitors to the beachfront. Visitor counts could be completed using permanently installed automatic counters, visual counts during site visits, or some other appropriate means.

10.9.6 Affected Environment and Environmental Consequences

Under NEPA, federal agencies must consider environmental effects of their actions that include, among others, impacts on social, cultural, and economic resources, as well as natural resources. The following sections describe the affected resources and environmental consequences of the project.

This proposed Early Restoration project would consist of an 8,200- ft. extension of a 10-ft.-wide concrete promenade from Oliver Street to Point Park. Amenities would be constructed south of the promenade, and water tie-ins would be constructed at Bernard Street and Buena Vista Street.

For the purposes of this Early Restoration project, the Trustee has adopted the HUD EA and focused the environmental analysis on only those features that are not included in the HUD EA:

- 500 linear ft. of promenade walkway on the western end of the project area
- Amenities
- Water tie-ins

Environmental impacts for the Early Restoration components are consistent with impacts discussed in the HUD EA. It is anticipated that the project impacts would be similar to the findings of the HUD EA. For those portions of the project that were previously reviewed by the HUD EA, the project would not result in a significant negative impact on the quality of the natural and human environment.

10.9.6.1 No Action

Both OPA and NEPA require consideration of the No Action alternative. For this Final Phase III ERP proposed project, the No Action alternative assumes that the Trustees would not pursue the Pascagoula Beachfront Promenade as part of Phase III Early Restoration.

Under No Action, the existing conditions described for the project site in the affected resources subsection would prevail. Restoration benefits associated with this project would not be achieved at this time.

10.9.6.2 Physical Environment

Geology and substrates, hydrology, water quality, air quality, greenhouse gas emissions, and noise are discussed in this section.

Geology and Substrates

Affected Resources

The proposed location of the promenade and amenities is part of an MsCIP Pascagoula Beach Boulevard Restoration Project recently completed by the USACE. The soils are composed of dredged material (sand) that was beneficially used from the Pascagoula Channel navigation dredging. The locations for the water tie-in connections consist of shallow sandy soils (maximum of 4 ft. below grade), heavily compacted beneath Beach Boulevard and at the right-of-way adjacent to the north of Beach Boulevard at Buena Vista and Bernard streets.

Environmental Consequences

There would be short-term minor impacts to geology, soils, and sediments during construction activities. There would also be short-term minor impacts during construction at the staging areas (Point Park, Beach Park, the sand beach, and other cleared lots), but these impacts are minor because these areas consist of paved, disturbed, or compacted exposed soil.

There would be short-term minor adverse impacts to geology and substrates during construction.

10.9.6.3 Hydrology and Water Quality

Affected Resources

Hydrology
The project area is crossed by two channels that extend from the Mississippi Sound into southern sections of the City of Pascagoula (Figure 10-19). These two channels receive stormwater runoff from the adjacent communities.

Stormwater runoff from residential lots along Beach Boulevard flows overland onto Beach Boulevard (which is sloped southward) and then onto the sand beach, where it infiltrates naturally. There are only a few stormwater catch basins along Beach Boulevard; stormwater drains from there to the Mississippi Sound.

Tides
The riprap along the seaward edge of the beach was built to elevation +2 ft. MLLW. Most of the beach was filled to elevation +3.5 ft. MLLW. The spring tidal elevation is approximately +2 ft. MLLW.

Wetlands
There are no jurisdictional wetlands in the project area as defined by the U.S. Army Corps of Engineers.

Floodplains
The beach promenade pathway is located in the 100-year floodplain and also in Zone VE as reported in Federal Emergency Management Agency (FEMA) Flood Insurance Rate Map (FIRM), Map Numbers 28059C0431G and 28059C0433G, effective March 16, 2009 (FEMA 2013). The Zone VE designation denotes areas of the Coastal Flood Zone with velocity hazard (wave action) with an established base flood elevation. Although the promenade project is located within the 100-year floodplain, it is functionally isolated from the traditional floodplain areas north of Beach Boulevard. The newly constructed sand beach where the beach promenade would be constructed is located on the Mississippi Sound. The Mississippi Sound has a surface water area of over 500,000 acres. It is tidally influenced and affected more by tides and storm surge than by floodwaters from riverine and watershed runoff.

Water Quality
The water resources in the area consist of two drainage channels that flow into the Mississippi Sound by crossing the created beach. The Mississippi Sound is located to the south of the project area; the Pascagoula River is located to the west. According to the State of Mississippi Water Quality Criteria for Intrastate, Interstate, and Coastal Waters (WPC-2), published by the Mississippi Department of Environmental Quality on June 28, 2012, the Mississippi Sound water body classification is “recreation,” and the Pascagoula River is used as a public water supply source.

Environmental Consequences

Hydrology
Placement of a concrete promenade would have long-term minor adverse impacts to hydrology and surface flows as water moves differently across impervious surfaces than it does across pervious areas. Overall, the total area of the promenade extension, 0.11 acre, would not alter surface water flows

considering the available area on the adjacent beach that remains pervious. There would be no impact to hydrology in the project area as a result of the proposed project.

Tides

There would be no tidal influence on the promenade or amenities. Construction of the project would not have an effect on tides or tidal hydrology in the area.

Wetlands

Although the proposed project is not located within a USACE jurisdictional wetland (USFWS 2013), it is located within a 'coastal wetland.' Coastal wetlands are defined under the Coastal Wetlands Protection Act as "all publicly-owned lands subject to the ebb and flow of the tide; which are below the watermark of ordinary high tide; all publicly-owned accretions above the watermark of ordinary high tide and all publicly-owned submerged water-bottoms below the watermark of ordinary high tide and includes the flora and fauna on the wetlands and in the wetlands." Because coastal wetlands are publicly owned lands below the historical water mark of ordinary high tide and some sand beach areas in coastal Mississippi are man-made, it is common in Mississippi for coastal wetland areas to not actually contain wetland vegetation and, instead, consist of dredged sand. A Mississippi Coastal Wetland Protection Act permit for construction of the Beachfront Promenade was issued by the Mississippi Department of Marine Resources (Permit No. DMR-110063 on October 19, 2010); the permit covers the entire length of the proposed promenade except for the western 500 ft. The permit issued by MDMR for the Beachfront Promenade on October 19, 2010 (Permit No. DMR-110063) would need to be modified by MDMR to include the western 500 ft., install amenities, and extend the time period permit, which expires on October 19, 2015. 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. On December 12, 2013, the Federal Trustees submitted a consistency determination to the MDMR for this project for appropriate state reviews coincident with public review of the Phase III DERP/ER. On February 4, 2014, The MDMR responded and concurred with the federal determination for the project for purposes of finalizing this early Phase III restoration plan. Permits for state-designated coastal wetlands would be obtained for the Pascagoula Beachfront Promenade (Miller 2014). The Trustee will coordinate with the USACE to verify that there is no requirement for a Section 404/10 permit.

Floodplains

Because of the physical and hydrological characteristics of this portion of the Mississippi Sound, direct and indirect effects to floodplain areas outside the specific limits of this project are not expected. Flooding of the project area would continue to occur during storm surges associated with tropical storm events and hurricanes. Although the project would be located in the floodplain, most of the components would be constructed essentially at grade, which would not aggravate current hazards to other floodplains and would not disrupt floodplain values.

Water Quality

During construction, there would be short-term minor impacts from increased turbidity in the drainage channels resulting from stormwater runoff from the construction zone. Also, construction fluids (oil, gas, lubricant) from construction equipment and vehicles could potentially leak into these channels. Appropriate BMPs would be implemented to avoid and minimize these impacts. In addition, any

sediment that may enter the two channels would likely settle out quickly in the Mississippi Sound, since sand is the dominant grain size within the construction zone. A stormwater pollution prevention plan (SWPPP) would be prepared and erosion, sedimentation, and stormwater runoff would be managed in accordance with Mississippi Department of Environmental Quality (MDEQ) stormwater requirements.

An increase of impervious surface would increase the area over which stormwater flows, releasing pollutants and other substances known to affect water quality. However, the small promenade extension (0.11 acre) combined with the coarse-grained soil would allow for infiltration of the stormwater runoff; long-term impacts are considered minor to negligible.

10.9.6.4 Air Quality and Greenhouse Gas Emissions

Affected Resources

Air Quality

Project construction would include use of gasoline- and diesel-powered construction vehicles and equipment (backhoes, excavators, a directional boring machine, a paving machine, and trucks). Impacts from emissions by this equipment would be minor and short term, limited to the duration of the construction period. In addition, the ground would be disturbed to a maximum depth of approximately 4 ft., which could introduce dust and particulates into the air. Considering that the predominant grain size is sand, the amount of fugitive dust would be expected to be small, and thus impacts would be very minor and short term.

After project completion, traffic volume in the area is anticipated to increase slightly as a result of additional visitors to the beach. However, given the current very low traffic density, air quality and greenhouse gas emissions (GHGs) impacts would be negligible.

Greenhouse Gas Emissions

The use of gasoline- and diesel-powered construction vehicles and equipment including trucks, backhoes, and dumptrucks, would contribute to an increase in GHG emissions. Table 10-32 details the construction equipment needed to complete the project, the total hours used for each type of equipment, and the emissions resulting from the use of equipment.

Based on the assumptions detailed in Table 10-32, the project would generate approximately 405.99 metric tons of GHGs over the duration of all phases. The following mitigation measures have been identified to reduce or eliminate GHG emissions from the project.

- Shut down idling construction equipment, if feasible.
- Locate staging areas as close to construction sites as practicable to minimize driving distances between staging areas and construction sites.
- Encourage the use of the proper size of equipment for the job to maximize energy efficiency.
- Encourage the use of alternative fuels or power sources for generators at construction sites, such as propane or solar power, or use electrical power where practicable.

Based on the above, and with the incorporation of mitigation measures, the project would have short-term minor impacts but no long-term impacts on GHGs.

Table 10-32. Greenhouse gas impacts—Pascagoula Beachfront Promenade.

EQUIPMENT DESCRIPTION	TOTAL HOURS USED	CO_2 FACTOR-MT*/ 100HRS	CO_2 (MT)	CH_4 FACTOR-MT/ 100HRS	CH_4 (MT)	NO_2 FACTOR-MT/ 100HRS	NO_2O (MT)	TOTAL CO_2 (MT)
Pick-Up Truck	1408	1.1	15.49	0.35	4.93	4.40	61.95	82.37
Trackhoe (300 series)	190	2.55	4.85	0.85	1.62	10.20	19.38	25.84
Backhoe (rubber tire)	232	1.78	4.13	0.58	1.35	7.60	17.63	23.11
Dumptrucks	205	1.70	3.49	0.50	1.03	7.20	14.76	19.27
Concrete Trucks	2039	1.70	34.66	0.50	10.20	7.20	146.81	191.67
Boom Truck	12	1.25	0.15	0.43	0.05	5.75	0.69	0.89
Line Truck / Auger Truck	82	1.25	1.03	0.40	0.33	5.50	4.51	5.86
Bobcat (T-300 Series)	163	2.65	4.32	0.90	1.47	10.6	17.28	23.06
Walk Behind Concrete Saw	65	0.50	0.33	0.20	0.13	2.20	1.43	1.89
Directional Boring Machine	190	1.25	2.38	0.43	0.82	5.75	10.93	14.12
Ditch Witch	155	0.75	1.16	0.35	0.54	3.44	5.33	7.04
Crane	80	2.55	2.04	0.85	0.68	10.2	8.16	10.88
Total	**4821**							**405.99**
*MT = metric tons								

Findings: Adverse impacts to air quality and GHGs would be short term and minor.

10.9.6.5 Noise

Affected Resources

The area to the north of Beach Boulevard is largely residential, and ambient noise levels are low. Industrial shipyards are located at the eastern and western ends of Beach Boulevard.

Environmental Consequences

The use of construction equipment (backhoe, excavators, a directional boring machine, and trucks) would have short-term minor noise impacts for the residents immediately to the north of Beach Boulevard. Noisy construction activities would not be conducted before 6:30 a.m. or after 7:00 p.m., Monday through Saturday, in compliance with the City of Pascagoula noise ordinance. The project would require approximately 360 days to complete; however, at least 50 percent of the construction activities associated with this project would be considered quiet construction.

During operation, traffic would likely increase slightly by users of the promenade. Impacts would be minor as the promenade is meant to encourage pedestrian-type activities.

Construction of the project would result in minor short-term adverse noise impacts to local residents.

10.9.6.6 Biological Environment

Living Coastal and Marine Resources

Affected Resources

Flora

The flora of the sand beach within the project area is limited to saltmeadow cordgrass (*Spartina patens*), which was planted by the USACE as an erosion-control measure on the southern half of the beach, approximately 150 ft. from Beach Boulevard. Other small patches of beach or upland grasses are also likely present. The existing vegetation covers a very small amount of surface area of the beach.

Invasive Species

The potential introduction of terrestrial and aquatic non-native invasive species of plants, animals, and microbes is a concern for any proposed project. Non-native invasive species could alter existing terrestrial or aquatic ecosystems, may cause economic damages and losses, and are frequently the second most common reason for protecting species under the Endangered Species Act. The species that are or may become introduced, established, and invasive are difficult to identify. The analysis focuses on pathway control or actions/mechanisms that may be taken or implemented to prevent the spread of invasive species on site or introduction of species to the site.

Fauna

The faunal species found in the project area include those associated with sand beach habitat and that developed uplands on the coast of the Mississippi Sound. However, the species richness of the area is likely limited due to the prevalence of human disturbance and the lack of habitat diversity. Birds likely use the sand beach and vegetation for refuge and resting and the adjacent open water for foraging. Birds could include herons, terns, gulls, and egrets as well as other shore and wading birds. Mammals have a transitory use and could use the sparse vegetation for shelter or foraging. These include rodents, squirrels, and other opportunistic feeders such as raccoons and opossums.

Environmental Consequences

Flora and Fauna

The zone of saltmeadow cordgrass *(Spartina patens)* planted by the USACE along the beach is located to the south of Beach Boulevard, and would not be impacted by the project. Short-term minor impacts to the scattered vegetation would occur if project construction covered these areas. However, the area proposed for the promenade extension is only 0.11 acre and represents a very small portion of the total beach area. This, combined with the sparse nature of existing vegetation, would not result in long-term impacts to flora. Additionally, short-term adverse impacts to wildlife species would not be anticipated because of the marginal quality of preferred or suitable habitat and the wildlife's ability to move away and avoid the area during construction. Long-term impacts to vegetation and protected species would not occur because the existing use of the area is similar to what is proposed, and impacts that would occur from a higher number of beach visitors would not result in a substantive difference.

Invasive Species

Environmental Consequences

BMPs to prevent the spread of invasive species through common pathways will be implemented thereby minimizing the potential for short and long-term adverse impacts from the proposed project. This project involves the construction of a beachfront promenade and amenity area. A variety of construction equipment will be used. Each of these actions and pieces of equipment serve as a potential pathway to introduce or spread invasive species. To ensure these pathways are "broken" and do not spread or introduce species the following BMPs will be implemented: all equipment to be used during the project, including personal gear, will be inspected and cleaned such that there is no observable presence of mud, seeds, vegetation, insects, and other species. The implementation of these BMPs meets the spirit and intent of EO 13112. Due to the implementation of BMPs, the Trustees expect risk from invasive species introduction and spread to be short term and minor.

Affected Resources

Protected Species

The U.S. Fish and Wildlife Service (USFWS) lists species as threatened or endangered when they meet criteria detailed under the Endangered Species Act (ESA) of 1973, as amended (16 U.S.C. §1531 et seq.). Additionally, Mississippi Wildlife Fisheries and Parks (MWFP) and NOAA National Marine Fisheries Service (NMFS) identify and list protected species. Section 7(a)(2) of the ESA requires that each federal agency ensure that any action authorized, funded, or carried out by the agency is not likely to jeopardize the continued existence of any endangered or threatened species or result in the destruction or adverse modification of critical habitat of those species. Migratory Bird compliance and Bald and Golden Eagle Protection Act compliance are discussed in this section.

Federally protected species that are known to occur or could occur in Jackson County are listed in Table 10-33. However, only the piping plover and five sea turtle species are likely to occur in or near the project area or could pass through the project area. There is no designated critical habitat for any species in or around the project area.

Environmental Consequences

Protected Species

Potential impacts to threatened or endangered species and their critical habitat are presented in Table 10-33 and discussed below. The piping plover (*Charadrius melodus*), red knot (*Calidris cancutus* rufa), and five sea turtle species are likely to occur near the project area and are discussed below.

Sea Turtles

There would be no impacts to sea turtles from the project, as the project area is located entirely on the restored beach or other previously disturbed or developed areas, and sea turtles cannot access the beach due to the riprap berm near the shoreline. The project would also have no effect on the migration and foraging of these species in adjacent waters. No short-term or long-term indirect impacts to the species would be expected.

Table 10-33. Pascagoula Beachfront Promenade—threatened and endangered species in Jackson County, Mississippi.

COMMON NAME	SCIENTIFIC NAME	FEDERAL STATUS	STATE STATUS	HABITAT
Reptiles				
Green Sea Turtle	*Chelonia mydas*	Threatened	Endangered	Shallow coastal waters with SAV and algae, nests on open beaches
Hawksbill Sea Turtle	*Eretmochelys imbricata*	Endangered	Endangered	Coral reefs, open ocean, bays, estuaries
Kemp's Ridley Sea Turtle	*Lepidochelys kempii*	Endangered	Endangered	Nearshore and inshore coastal waters, often in salt marshes; neritic zones with muddy or sandy substrate (NOAA Fisheries 2013)
Leatherback Sea Turtle	*Dermochelys coriacea*	Endangered	Endangered	Open ocean, coastal waters
Loggerhead Sea Turtle	*Caretta caretta*	Threatened	Endangered	Open ocean; also inshore areas, bays, salt marshes, ship channels, and mouths of large rivers
Birds				
Piping Plover	*Charadrius melodus*	Endangered	Endangered	Beaches and mudflats in southeastern coastal areas
Red Knot	*Calidris canutus rufa*	Proposed	--	Marine intertidal habitats including inlets, estuaries, and bays feeding in mud and sand flats on beaches and barrier islands

Piping Plover and Red Knot

Mainland beaches in Mississippi are used as wintering habitat for piping plovers, but nesting does not occur. The project area does not include any critical habitat for piping plovers and contains elements (i.e., hardened toe, vegetation, and development) that make the area less desirable as wintering habitat for this species. During construction, there may be short-term minor localized noise that could affect transient winter use of the area by piping plover and red knot. There would be no long-term impacts to this species as a result of project construction.

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

Findings: Short-term adverse impacts to biological resources would be minor, if any. No long-term adverse impacts are expected. ESA Section 7 consultation was completed with USFWS on January 24, 2014 (McClain, 2013). The USFWS concurred that the project, as proposed, may affect, but is not likely to adversely affect piping plover (*Charadrius melodus*) or red knot (*Calidris cancutus rufa*) (if listed). No effects are anticipated to other species considered within the consultation. The Trustees intend to implement measures that are required by the USFWS and would consider any additional practices that may emerge from additional regulatory consultations. The measures from the consultations include:

- Awareness of turtle presence. If any turtles are found to be present in the immediate project area during project activities, construction will be halted until the species move away form the project area. In addition, impacts to lands or waters surrounding the project area will be prevented, controlled or mitigated by use of all available best management practices during construction.
- Awareness of piping plover/red knot presence. Pre-operational surveys will be completed if equipment has left ruts on the “beach” or if equipment is staged on the “beach.” If any piping plovers or red knots are found to be present in the immediate project area during project activities, construction will be halted until the species move away from the project area or construction activities will resume at a safe distance from the species. During construction, attempts will be made to limit the use of heavy equipment on the “beach” area. To the degree possible, construction activities will be concentrated in months when piping plovers and red knots are in breeding areas. Pets are currently not allowed on the “beach” except on the far western end; these pets must be leashed. In addition, all available construction best management practices will be used to prevent control, or mitigate any impacts during construction especially from accidental leaks of fluids from equipment.

Migratory Birds

Affected Resources

Migratory bird guilds that could have presence in the Pascagoula Beachfront Promenade project area include wading birds, shorebirds, seabirds, raptors, rails and coots, landbirds, and doves and pigeons (see Table 10-34).

Bald and Golden Eagle Protection Act

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

Table 10-34. Migratory birds anticipated in the Pascagoula Beachfront Promenade project area.

SPECIES*	BEHAVIOR	SPECIES/HABITAT IMPACTS
Wading birds (herons, egrets, ibises, wood stork, American flamingo)	Foraging, feeding, resting, roosting, nesting	Wading birds primarily forage and feed at the water's edge. The project area does not include water's edge habitat; therefore, foraging and feeding would not be impacted. These birds primarily nest and roost in trees or shrubs (e.g. pines, *Bacchurus* and mangroves), which occur outside the project area.
Shorebirds (plovers, oystercatchers, stilts, sandpipers)	Foraging, feeding, resting, roosting, nesting	Shorebirds forage, feed, rest, and roost in beach environments. Foraging and feeding habitats include sand or mud flats exposed by tides. There are no tidally exposed sand flats in the project area and it is expected that they would be able to move to another nearby location to continue resting. Although the project area includes ocean "beach," these birds primarily nest and roost in dunes, which occur outside the project area. There is no dune habitat in the project area.
Seabirds (terns, gulls, skimmers, double-crested cormorant, American white pelican, brown pelican)	Foraging, feeding, resting, roosting, nesting	Seabirds forage, feed, rest, and roost in marine coasts including islands, marshes, river/lake banks, and sand or gravel beaches including ocean beaches. As such, they may be impacted locally and temporarily by the project. It is expected that they would be able to move to another nearby location to continue foraging, feeding and resting. Although the project area includes ocean "beach," these birds primarily roost in dunes, which occur outside the project area.
Raptors (osprey, hawks, eagles, owls)	Foraging, feeding, resting, roosting, nesting	Raptors could forage, feed, and rest in the project area. As such, they may be impacted locally and temporarily by the project. It is expected that they would be able to move to another nearby location to continue foraging, feeding and resting. Most raptors are aerial foragers and soar long distances in search of food. There are no roosting or nesting habitats within the project area.
Goatsuckers (nighthawks, whip-poor-will, Chuck-will's widow)	Foraging, feeding, resting, roosting, nesting	Goatsuckers do not forage, feed, rest, and roost in the project area. In addition, they are nocturnal/crepuscular and therefore not active during the project work period. They nest in thickets and woodlands, which are not included in the project area.
Waterfowl (geese, swans, ducks, loons, and grebes)	Foraging, feeding, resting, roosting, nesting	Waterfowl do not forage, feed, rest, and roost in the project area.
Doves and Pigeons	Foraging, feeding, resting, roosting	Doves and pigeons could forage, feed, rest, and roost in the project area. However, they are unlikely to utilize sandy habitat.
Rails and Coots	Foraging, feeding, resting, roosting, nesting	Rails and coots likely do not forage, feed, rest, and roost in the project area. For nesting, birds favor marshy areas for which are not within the project area.

Migratory Bird Treaty Act

The Trustee has reviewed the project site and determined that migratory bird nesting is not known or likely, but is possible. The MBTA requires the protection of all migratory bird species and protection of ecosystems of special importance to migratory birds against detrimental alteration, pollution, and other environmental degradation. Coordination under MBTA with the USFWS was completed on January 24, 2014. Due to the implementation of the following Best Management Practices, no "take" is anticipated.

Work will be completed in daylight hours. If evidence of nesting is found during construction, coordination with the USFWS would be initiated to develop and implement appropriate conservation measures.

Bald and Golden Eagle Protection Act

There are no golden eagles in the project area. No bald or golden eagles are known to nest within 660 ft. of the project area. Thus, no impacts to golden or bald eagles are anticipated. Coordination under BGEPA by the USFWS was completed on January 24, 2014. Because there is no nesting nearby, no "take" is anticipated.

10.9.6.7 Human Uses and Socioeconomics

Socioeconomics and Environmental Justice

Affected Resources

Socioeconomic resources combine the social resources and economic resources of the area. The social resources evaluation includes consideration such as potential changes in neighborhoods or community cohesion; affordable housing; changes in travel patterns and accessibility; impacts on community facilities; impacts on traffic safety/public safety; and impacts on any special groups such as elderly, handicapped, minority, and transit-dependent persons. The data in this section was compiled using the Census and American Factfinder websites (U.S. Census Bureau 2011 and 2012).

Based on the U.S. Census 2010 and the 2007 – 2011 American Community Survey data, there were 139,668 people and 52,205 households in Jackson County. The racial makeup of the county was 72.0 percent White, 22.0 percent Black or African American, <1 percent Native American, <1 percent Asian, 1.9 percent from other races, and 1.9 percent from two or more races. Hispanic or Latino, of any race, comprised 4.6 percent of the population. Out of the 52,205 households, 31.7 percent had children under the age of 18 living with them, 49.6 percent were married couples living together, 16.4 percent had a female householder with no husband present, and 28.2 percent were non-families. Of the non-family households, 23.1 percent were made up of individuals, and 8.0 percent had someone living alone who was 65 years of age or older. The average household size was 2.65, and the average family size was 3.11. The median age was 37.2 years. In 2010, median household income in Jackson County was $49,620. The per capita income for the county was $23,547. About 11.0 percent of families and 15.0 percent of the population were below the poverty line, including 21.2 percent of those under age 18 and 9.8 percent of those aged 65 or older. The labor force in Jackson County totaled approximately 67,904 in 2010.

Industries providing employment in Jackson County were:

- Agriculture, forestry, fishing and hunting, and mining (1.7 percent)
- Construction (7.2 percent)
- Manufacturing (17.9 percent)
- Wholesale trade (1.9 percent)
- Retail trade (11.3 percent)
- Transportation and warehousing and utilities (3.8 percent)
- Information (1.6 percent)
- Finance and insurance, real estate and rental/leasing (4.6 percent)
- Professional, scientific, management, administrative, and waste management services (6.7 percent)
- Educational services, health care, and social assistance (18.4 percent)
- Arts, entertainment, recreation, accommodation, and food services (15.3 percent)

- Other services (3.9 percent)
- Public administration (5.7 percent)

More specifically, the majority of the project is located in Census Tract 425. Based on the U.S. Census 2010 data and the 2007 – 2011 American Community Survey, there were 2,217 people and 816 households in these tracts. The racial makeup of the these tracts was 86.8 percent White, 11.8 percent Black or African American, <0.1 percent Native American <0.1 percent Asian, 0.8 percent from other races, and 0.6 percent from two or more races. Hispanic or Latino, of any race, comprised 2.7 percent of the population. Out of the 816 households, 28.3 percent had children under the age of 18 living with them, 40.4 percent were married couples living together, 15.9 percent had a female householder with no husband present, and 37.6 percent were non-families. Of the non-family households, 32.7 percent were made up of individuals, and 14.5 percent had someone living alone who was 65 years of age or older. The average household size was 2.39, and the average family size was 3.06. The median income for a household in the tracts was $40,300, and the median income for a family was $58,263. The per capita income for the county was $24,579. About 10.0 percent of families and 13.5 percent of the population were below the poverty line, including 18.9 percent of those under age 18 and 3.2 percent of those aged 65 or older. The combined labor force for Census Tract 425 was 945 in 2010.

Industries providing employment in Census Tract 425 were:

- Agriculture, forestry, fishing and hunting, and mining (2.9 percent)
- Construction (9.1 percent)
- Manufacturing (32.4 percent)
- Wholesale trade (0.8 percent)
- Retail trade (12.1 percent)
- Transportation and warehousing and utilities (5.8 percent)
- Information (0.6 percent)
- Finance and insurance, real estate and rental/leasing (2.4 percent)
- Professional, scientific, management, administrative, and waste management services (9.1 percent)
- Educational services, health care, and social assistance (12.7 percent)
- Arts, entertainment, recreation, accommodation, and food services (0.9 percent)
- Other services (5.3 percent)
- Public administration (5.8 percent)

A comparison of race and poverty from Tract 425 to Jackson County is shown on Table 10-35.

Environmental Consequences

There would be short-term beneficial socioeconomic impacts to the local community from this project. Construction of the project would provide benefits from employment and use of local businesses (restaurants, construction supplies, etc.). Following construction, the promenade and associated amenities would provide long-term benefits though improved recreational enjoyment of the Pascagoula shoreline for residents and visitors, which would have a long-term beneficial impact on existing businesses and services in the immediate area. Short-term and long-term beneficial socioeconomic impacts would be expected.

Table 10-35. Comparison of race and poverty of Census Tract 425 to Jackson County.

	TRACT 425	JACKSON COUNTY		TRACT 425	JACKSON COUNTY
Median household income	$40,300	$49,620	White	86.8%	72.0%
Per capita income	$24,579	$23,547	Black or African American	11.8%	22.0%
Families below poverty line	10.0%	11.0%	Native American	<0.1%	<1.0%
Individuals below poverty line	13.5%	15.0%	Other races (including Asian)	0.8%	3.1%
Under 18 below poverty line	18.9%	21.2%	Two or more races	0.6%	1.9%
Over 65 below poverty line	3.2%	9.8%	Hispanic or Latino, of any race	2.7%	4.6%

Environmental Justice

The project is adjacent to Beach Boulevard. There would be no disproportionate impact to low-income or minority populations as a result of constructing the project.

10.9.6.8 Cultural Resources

Affected Resources

This project is currently being reviewed under Section 106 of the NHPA to identify any historic properties located within the project area and to evaluate whether the project would affect any historic properties.

The project area is a sea wall protection area (man-made beach). A preliminary cultural resource investigation was completed for the project area which included a literature review and limited field reconnaissance (R. Christopher Goodwin & Associates, 2013). A review of the Mississippi Department of Archives and History's Historic Resources Inventory database located 43 properties listed on the National Register of Historic Places and five designated as National Historic Landmarks in and around the city of Pascagoula, Mississippi. Six properties listed on the National Register of Historic Places were destroyed by Hurricane Katrina and are no longer extant. No properties listed on the National Register of Historic Places or designated as National Historic Landmarks were identified within the proposed Pascagoula Beachfront Promenade project area. No further study is the recommendation of the preliminary cultural resource investigation (R. Christopher Goodwin & Associates, 2013).

Environmental Consequences

Nearly all of the project area consists of the recently created beach and is highly disturbed. Therefore, no cultural resources impacts would be expected. Cultural resources impacts are not anticipated at the Point Park staging area, other potential staging areas, or the areas of utility connections beneath and adjacent to Beach Boulevard as these are also highly disturbed areas. Nonetheless, the National Historic Preservation Act of 1966 (NHPA) charges the federal government with considering the potential effects of its actions on the nation's cultural and historic resources. A complete review of this project under Section 106 of the NHPA is ongoing and would be completed prior to any project activities that would restrict consideration of measures to avoid, minimize or mitigate any adverse effects on historic properties located within the project area. This project would be implemented in accordance with all applicable laws and regulations concerning the protection of cultural and historic resources.

10.9.6.9 Infrastructure

Affected Resources

The affected infrastructure consists of Beach Boulevard and existing parking areas at Point Park and Beach Park. According to the Traffic Count Database System provided by Gulf Coast Regional Planning Commission, the annual average daily traffic count in 2011 on Beach Boulevard in the proposed project area ranged from 1,800 to 1,900 cars (GRPC 2013).

Lighting is installed along the southern side of Beach Boulevard. Sanitary sewer and potable water services are provided by the City of Pascagoula and are located within the street rights-of-way. Garbage pick-up services are provided to the City of Pascagoula by Delta Sanitation Services.

Environmental Consequences

Portions of Beach Boulevard would be temporarily restricted during construction of the utility tie-ins. The project is intended to move existing pedestrians and bicyclists off the road shoulder and onto a safe walkway. Since the users are already there, no substantial increase in traffic would be expected. Any increased traffic from tourism would follow existing road routes and should be assimilated into existing local traffic. High tourist-based traffic is handled regularly in the area when large gatherings occur at the Beach Park, so the increase from the promenade would not have an impact on tourist-based traffic.

The project would result in minor short-term adverse impacts to traffic and infrastructure during construction; no long-term impacts would be expected.

10.9.6.10 Land and Marine Management

Affected Resources

The proposed project is located within an area zoned as Single-Family Residential 10 (SFR-10). SFR-10 District is established and intended to accommodate primarily single-family detached dwellings at low densities on lots greater than 10,000 square ft. in area. The District also accommodates accessory dwelling units and complementary nonresidential uses usually found in low-density urban residential neighborhoods. Some of these nonresidential uses are permitted uses (e.g., parks, community centers, elementary schools, places of worship), while others are special uses, allowed only after approval of a Special Use Permit (e.g., libraries, day cares, secondary schools, post offices, government offices, fire/emergency medical services/police stations, cemeteries).

The project is located within the Mississippi Coastal Zone as defined in the Mississippi Coastal Program (MCP) of 1980. The MCP, which is administered by the Mississippi Department of Marine Resources (MDMR), was developed by the MDMR in accordance with the Coastal Zone Management Act of 1972, and guides and regulates the use of coastal resources in the Mississippi Coastal Zone. The City of Pascagoula received a Coastal Zone Consistency letter for the original Beachfront Promenade project on October 26, 2010.

Environmental Consequences

The 500-ft. extension of the 8,200-ft.-long promenade would be constructed on approximately 1.9 acres out of 33 acres of the created sand beach. The land use of the area would remain unchanged by this project.

The staging areas at Point Park and Beach Park would be used during construction and would be temporarily altered. Point Park consists of compacted earth and is largely undeveloped land that is used occasionally by residents for temporary parking while they access the waterfront. The staging area at Beach Park consists of a paved parking lot. Use of these areas for staging may slightly limit parking in these areas temporarily, but this would be consistent with existing land uses.

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.

Finding: Construction of the Pascagoula Beachfront Promenade is consistent with current land and marine management plans and activities in the project area.

10.9.6.11 Aesthetics and Visual Resources

Affected Resources

The affected environment consists of a two-mile-long shoreline with residential buildings to the north, a two-lane road (Beach Boulevard) parallel to the shoreline, a created sand beach south of the proposed promenade area, and the Mississippi Sound. Receptors would consist primarily of local residents and beach visitors.

Environmental Consequences

During construction, there would be minor short-term adverse aesthetic and visual resource impacts due to the construction equipment, the disturbed state of the promenade and utility connection construction sites.

During operation, there would be long-term beneficial impacts to aesthetics and visual resources from the promenade. The completion of the promenade would provide a pleasant and attractive area for recreational pursuits and, therefore, would improve and enhance the visual resources along the Pascagoula beachfront, both for local residents and beach visitors.

There would be minor short-term adverse impacts to aesthetics and visual resources during construction and long-term beneficial impacts during operation.

10.9.6.12 Tourism and Recreational Use

The recently nourished beach is used by residents and visitors; access is open to the general public. Currently, pedestrians walk mainly on the shoulder of Beach Boulevard, which is unprotected from vehicular traffic.

Environmental Consequences

During construction of the promenade, there would be minor short-term adverse impacts to public access and use of the portions of the roadway shoulder currently used for walking; access would be restricted due to safety concerns. The beach would still largely be accessible except in the areas that are under construction.

Project impacts from increased visitor use could include littering and noise from individuals utilizing the proposed project components. The adverse impacts will be sporadic, minor and short-term in nature. Pascagoula Beach is a man-made seawall protection project (beach); any habitat is man-made. Litter

removal will minimize the impact to native species or natural habitats. The City of Pascagoula will be responsible for monitoring litter accumulation, litter removal and maintenance. Noise from visitors using the promenade or amenities would occur adjacent to Beach Boulevard with only very limited habitat in the vicinity of the project.

During operation, there would be long-term beneficial impacts on public access and recreation in the area. The purpose of the promenade is to increase the accessibility of the beachfront area for recreational opportunities and to improve safety conditions for pedestrians and cyclists. The promenade would be available for walking, running, and nature viewing. It would also allow for easier access to the beach and associated amenities.

There would be minor short-term adverse impacts to tourism and recreational use due to construction and visitor use, and long-term benefits to recreation overall.

10.9.6.13 Public Health and Safety

Affected Resources

The seawall was recently repaired and the beach was restored at the project site by USACE to minimize shoreline erosion along Beach Boulevard, which in turn protects the seawall, roadbed and residential areas along Beach Boulevard. Currently, pedestrians walking along the shoulder of the Beach Boulevard (which is at the same elevation as the road) is a public safety concern.

Environmental Consequences

During construction, there would be safety concerns in the construction zone. However, signs and barricades would be used to ensure safety to workers and to the public. Adverse impacts would, therefore, be expected to be minor and short term. Once completed, walking along Beach Boulevard would be safer as the promenade would be wider than the current shoulder, and pedestrians and cyclists would be protected by a concrete pedestrian barrier. Lighting conditions would also be improved.

There would be minor short-term adverse impacts to public health and safety during construction and long-term benefits to public health and safety.

10.9.7 Summary and Next Steps

The proposed Pascagoula Beachfront Promenade project is intended to restore lost recreational opportunities resulting from the Spill and related response actions. This project would enhance recreational shoreline access via the construction of a lighted concrete beachfront pedestrian pathway adjacent to a sand beach in Pascagoula, Mississippi. Project funds would be used to help complete a two-mile, 10-ft.-wide lighted concrete pathway complete with amenities. This Early Restoration project proposal would fund a portion (8,200 ft.) of the 10-ft. wide promenade, a portion of which has already been constructed. The project is consistent with Alternative 3 (Contribute to Providing and Enhancing Recreational Opportunities) and Alternative 4 (Preferred Alternative).

For the Proposed Action, DOI adopted the U.S. Department of Housing and Urban Development (HUD) EA entitled “Environmental Assessment and Finding of No Significant Impact for HUD-funded Proposals, Pascagoula Beach Promenade Project” (HUD 2011). The DOI regulations also provide that, when a proposed action differs from the proposed action contained in the adopted EA, DOI may augment the

adopted EA to make it consistent with the proposed action (see 43 C.F.R. 46.320). This supplemental NEPA analysis provided in this document augments the existing HUD EA. This supplemental analysis considers any additional environmental impacts that would result from the elements of the Phase III Proposed Action that are not described and analyzed in the adopted HUD EA. These elements include an additional 500 ft. of concrete pathway at the upper reaches of the existing pathway on Pascagoula Beach, and proposed visitor amenities that are proposed for the entire pathway in the amenity area along 8,200 linear ft. of boardwalk.

The environmental consequences (adopted EA and supplemental analysis) suggest that while there would be minor adverse impacts to some resource categories, there would be no long-term moderate to major adverse impacts as a result of the project. The project would provide long-term benefits by providing enhanced shoreline access via the promenade and associated amenities. The Trustees have completed coordination and reviews under the Endangered Species Act, the Migratory Bird Treaty Act, the Magnuson-Stevens Fishery Conservation and Management Act, and the Bald and Golden Eagle Protection Act. Consistency reviews of the proposed Phase III early restoration projects in Mississippi were initiated by the Federal Trustees under the Coastal Zone Management Act and have been completed. The Trustees have initiated consultation under the Historic Preservation Act and other federal statutes. The Trustees have considered public comment and information relevant to environmental concerns bearing on the proposed actions or their impacts. Trustees' determination on selection of this project will be included in the Record of Decision.

Throughout the design process, every practical attempt was made to avoid and minimize potentially adverse environmental, social, and cultural impacts. The following BMPs and conservation measures that (sorted by resource type) would be utilized to minimize impacts to resources:

- Hydrology and Water Quality
    - A stormwater pollution prevention plan (SWPPP) would be prepared and erosion, sedimentation, and stormwater runoff would be managed in accordance with Mississippi Department of Environmental Quality (MDEQ) stormwater requirements.
    - Construction in Mississippi is required to follow the “Erosion Control, Sediment Control and Stormwater Management on Construction Sites and Urban Areas” (MDEQ 2012) and the “Field Manual for Erosion and Sediment Control on Construction Sites in Mississippi” (MDEQ 2005).
- Green House Gas Emissions
    - Shut down idling construction equipment, if feasible.
    - Locate staging areas as close to construction sites as practicable to minimize driving distances between staging areas and construction sites.
    - Encourage the use of the proper size of equipment for the job to maximize energy efficiency.
    - Encourage the use of alternative fuels or power sources for generators at construction sites, such as propane or solar power, or use electrical power where practicable.
- Noise
    - Noisy construction activities would not be conducted before 6:30 a.m. or after 7:00 p.m., Monday through Saturday, in compliance with the City of Pascagoula noise ordinance.

- Protected Species
    - Awareness of turtle presence. If any turtles are found to be present in the immediate project area during project activities, construction will be halted until the species move away form the project area. In addition, impacts to lands or waters surrounding the project area will be prevented, controlled or mitigated by use of all available best management practices during construction.
    - Awareness of piping plover/red knot presence. Pre-operational surveys will be completed if equipment has left ruts on the "beach" or if equipment is staged on the "beach." If any piping plovers or red knots are found to be present in the immediate project area during project activities, construction will be halted until the species move away from the project area or construction activities will resume at a safe distance from the species. During construction, attempts will be made to limit the use of heavy equipment on the "beach" area. To the degree possible, construction activities will be concentrated in months when piping plovers and red knots are in breeding areas. Pets are currently not allowed on the "beach" except on the far western end; these pets must be leashed. In addition, all available construction best management practices will be used to prevent control, or mitigate any impacts during construction especially from accidental leaks of fluids from equipment.
- Migratory Birds
    - Work will be completed in daylight hours. If evidence of nesting is found during construction, coordination with the USFWS would be initiated to develop and implement appropriate conservation measures.
- Tourism and Recreation Use
    - The City of Pascagoula will be responsible for monitoring litter accumulation, litter removal and maintenance.
- Invasive Species
    - All equipment to be used during the project, including personal gear, will be inspected and cleaned such that there is no observable presence of mud, seeds, vegetation, insects , and other species.
    - Oyster cultch and vegetation will be treated or inspected to remove "non-target" species.
- Public Health and Safety
    - Public access would be restricted during active construction areas due to safety concerns.

10.9.8 References

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10.10 Cumulative Effects

10.10.1 Introduction

The CEQ regulations for implementing NEPA require the assessment of cumulative impacts in the decision-making process for federal projects. The regulations define cumulative impacts as the:

> *impact on the environment which results from the incremental impact of the action when added to other past, present and reasonably foreseeable future actions regardless of what agency (Federal or non-Federal) or person undertakes such other actions.*[12]

In the context of the Phase III Early Restoration Program, cumulative impacts assessment requires the Trustees to (1) define appropriate spatial and temporal boundaries for the analysis; (2) describe baseline environmental and/or socioeconomic conditions for affected resources within the spatial and temporal boundaries; (3) identify future government and private actions that can be reasonably expected to have a significant impact on the affected resources; and (4) characterize the cumulative impacts of the proposed project assuming implementation of the other current and reasonably foreseeable future actions.Given the broad geographic scope of the Phase III program, the requirement for cumulative impacts analysis poses unique challenges. Although Early Restoration encompasses projects located across hundreds of miles of Gulf of Mexico coastline, a cumulative analysis of all impacts across the Gulf is not practically feasible. Moreover, at that scale, local or regional detail would not be sufficient for analysis. Instead, the Trustees have developed a cumulative impacts approach built around discrete, state-by-state, spatially-based project groupings that focus the analysis on the most likely areas for cumulative resource impacts (e.g., watersheds, estuaries or counties). This is designed to supplement the programmatic cumulative impact analysis found in Chapter 6. Following the CEQ guidance for scoping cumulative analyses, the goal is not to capture every theoretically possible impact, but instead 'to count what counts.'[13] Defining spatial boundaries in this manner also facilitates the detailed analysis of baseline environmental and socioeconomic conditions.

Once the project spatial groups have been selected and baseline conditions characterized, the cumulative impacts process depends heavily on the availability of information and data about current and likely future actions. For the analysis of the Phase III program, the Trustees identified current and potentially significant future actions through consultations with local, state and federal environmental experts familiar with major environmental and development initiatives that have a potential to contribute substantially to cumulative impacts. In some cases, environmental analyses of reasonably foreseeable actions are available to inform the Trustees' analyses. But in the absence of such completed analyses, the Trustees generally had to rely on expert judgments, primarily qualitative, about the potential for impacts, using publicly available information about the likely design and location of these actions.

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[12] 40.C.F.R.1508.7

[13] *ibid.*

For the Mississippi Phase III Early Restoration projects, the Trustees believe the cumulative impact analyses discussed here represent best estimates of how current environmental and socioeconomic conditions may be changed by the proposed actions when their impacts are layered on top of other current and reasonably foreseeable future actions. It is also clear, however, that these assessments remain subject to numerous uncertainties and data limitations. Nonetheless, because the proposed Mississippi Phase III Early Restoration projects are all designed to improve environmental quality directly or to increase public access and enjoyment of natural resources, the Trustees concluded that the projects are unlikely to increase adverse cumulative impacts over the longer term. The reasons for this conclusion are detailed in the remainder of this chapter.

10.10.2 Spatial and Temporal Boundaries for Mississippi Projects

10.10.2.1 Spatial Boundaries

The proposed Phase III Early Restoration projects located in Mississippi can be implemented independently of one another and are in separate and distinct locations, thus the potential for adverse cumulative impacts at a state-wide scale is minimal. The projects were therefore grouped geographically to analyze the potential for cumulative impacts at appropriate smaller regional scales (Figure 10-20).

In developing the following cumulative impact analysis, the cumulative actions discussed in Chapter 6 were considered (e.g. marine transportation, oil and gas, etc.). Past, present, and reasonably foreseeable future actions were identified as part of the cumulative analysis. This analysis considers the incremental contribution of proposed Phase III Early Restoration projects to potential cumulative impacts on resources discussed in Chapter 3. The analysis includes resources that are relevant to the concerns identified on the smaller regional scale.

Figure 10-20. Mississippi Cumulative Effect Project Groups.

For Mississippi, two regional or spatial groupings were developed. They are Group 1-Hancock County Marsh Living Shorelines/Restoration at the INFINITY Science Center; and Group 2-Popp's Ferry Causeway Park/Pascagoula Beachfront Promenade.

- Group 1: The Hancock County Marsh Living Shoreline/Restoration Initiatives at INFINITY Science Center are both located in Hancock County and both are adjacent to the Hancock County Marsh Preserve.
- Group 2: The Popp's Ferry Causeway Park/Pascagoula Beachfront Promenade are located along the Mississippi Coast and in urban environments. They are situated along the shorelines of Back Bay and the Mississippi Sound and in urban areas and will have similar adverse effects as well as benefits.

Regional groups were analyzed for, past, present, and reasonably foreseeable future actions which could result in cumulative impacts to the affected resource when combined with the impacts of the projects being considered (Figure 10-20). Cultural resource investigations and consultations would be completed for all the proposed projects that are selected for implementation. Although no cumulative impacts to cultural resources are anticipated, there is insufficient information at this time to make such determinations. If cultural resources would be impacted, mitigation identified during the consultation process would be implemented.

10.10.2.2 Temporal Boundaries

As detailed in Chapter 6 of the FERP/PEIS, the temporal boundary describes how far into the past and forward into the future actions should be considered in the impact analysis. The temporal boundaries may vary for each resource. Once the impacts of the proposed actions are no longer experienced by the affected resource, the cumulative impacts of the other past, present and reasonably foreseeable future actions need no longer be considered. For the most part, actions are qualified as those that are anticipated to persist beyond the construction phase for Phase III proposed projects and those that are ongoing for other actions considered in the cumulative analysis.

Identification of Other Actions Included in the Cumulative Impact Scenarios

For purposes of the cumulative impacts analyses in this Chapter, past actions are assumed to be represented in the existing conditions discussed in the Environmental Reviews for the Mississippi projects.

Present actions are those that are occurring now and result in ongoing impacts to the same resources that the proposed action will impact.

Reasonably foreseeable future actions are those actions that are likely to occur and affect the same resource as the proposed alternatives. The determination of what future actions should be considered requires a level of certainty that they will occur to ensure that the consideration of future actions is not overly speculative. This level of certainty could be met by a number of factors such as the completion of permit applications, the subject of approved proposals or planning documents, or other similar evidence. Determining how far into the future to consider actions is based on the impact of the alternatives being considered.

10.10.3 Group 1 Phase III -Hancock County Marsh Living Shoreline/Restoration Initiatives at INFINTY Science Center

Table 10-36 summarizes the impacts to resources associated with proposed Mississippi projects in the Hancock County region for the Hancock County Marsh Living Shoreline/ Restoration Initiatives at INFINITY Science Center projects, which are a habitat and living coastal and marine resource project and a recreational use project, respectively. The projects occur adjacent to the Hancock County Marsh Preserve in southern Hancock County near the mouth of the Pearl River in the Mississippi Sound. Restoration Initiatives at INFINITY Science Center is adjacent to the Pearl River and the upper Hancock County Marsh Preserve. Projects are evaluated together to determine if they have any cumulative effects that, when combined with other past, present, and reasonably foreseeable future actions in the Group 1 area, may result in cumulative effects to resources. Cultural resource investigations and consultations would be completed for all the proposed projects as environmental review continues. Although no cumulative impacts to cultural resources are anticipated, there is insufficient information at this time to make determinations. If cultural resources would be impacted, mitigation identified during the consultation process would be implemented.

Table 10-36. Summary of Impacts of Proposed Phase III Early Restoration Projects/Hancock County Marsh Living Shorelines and Restoration Initiatives at INFINITY Science Center.

Group 1	Geology and Substrates	Hydrology and Water Resources	Air Quality and GHGs	Noise	Living Coastal and Marine Resources	Protected Species	Habitats	Socioeconomics and Environmental Justice	Land and Marine Management	Aesthetics and Visual Resources	Tourism and Recreational Use	Infrastructure	Public Health and Safety and Shoreline Protection
Hancock County Marsh Living Shoreline	-/+	-/+	S	s	+	+	-/+	+	+	S	+	NE	+
Restoration Initiatives at INFINITY Science Center	-	-	S	-	NE	NE	S	+	+	+	+	+	NE
- Represents an adverse impact; + represents a beneficial impact; s represents a short-term adverse impact; NE represents no effect													

Existing Conditions

Existing environmental and socio-economic conditions in and around Group 1 Phase III Early Restoration projects are represented by the affected environment in the preceding environmental reviews. The existing conditions include the environmental impacts of past projects in the area and therefore are the assumed existing conditions for the cumulative analysis of impacts for ongoing, present and reasonably foreseeable future actions.

Summary of Impacts Group 1 Phase III Early Restoration Projects

All of the resource areas listed in Table 10-36 above would be affected by at least some of the Phase III Early Restoration projects included in Group 1. These effects would not be anticipated to extend beyond the construction period for the most part. Some resource areas would be affected long term, some beneficially and some adversely. However, none of the Phase III Early Restoration projects included in Group 1 would result in any long-term adverse effects that rise above a moderate status. In fact, for many of the resources, Phase III Early Restoration projects would result in long-term benefits. Overall, long-term benefits from Phase III Early Restoration projects proposed in the Group 1 region are expected to outweigh the short-term adverse impacts necessary for project implementation as well as long-term moderate adverse effects.

Identification of Past,Present and Reasonably Foreseeable Future Actions and Impacts

Past, present, and reasonably foreseeable activities in Group 1 projects in Hancock County include marine transportation projects, scientific research projects, tourism and recreation projects, and restoration and environmental stewardship activities with various types of adverse impacts as well as benefits. **Error! Reference source not found.** displays the past, present, and reasonably foreseeable future activities.

Error! Reference source not found. below identifies present and reasonably foreseeable future projects in each of the categories described in Chapter 6. For each of the actions, the table provides (1) a brief description of the action and (2) a listing of resource categories that are the most likely areas of concern for cumulative impacts when the action is considered in conjunction with implementation of Group 1 projects. In most cases, detailed environmental impact data are not available for these other actions. Consequently, the analyses generally reflect qualitative discussions about potential impacts based on best professional judgment. Also, as noted previously, the focus of the cumulative impacts analysis is on the resource areas that are deemed most likely to exhibit cumulative impacts; hence the analysis does not include in the listing those resources where impacts have been judged to be de minimis.

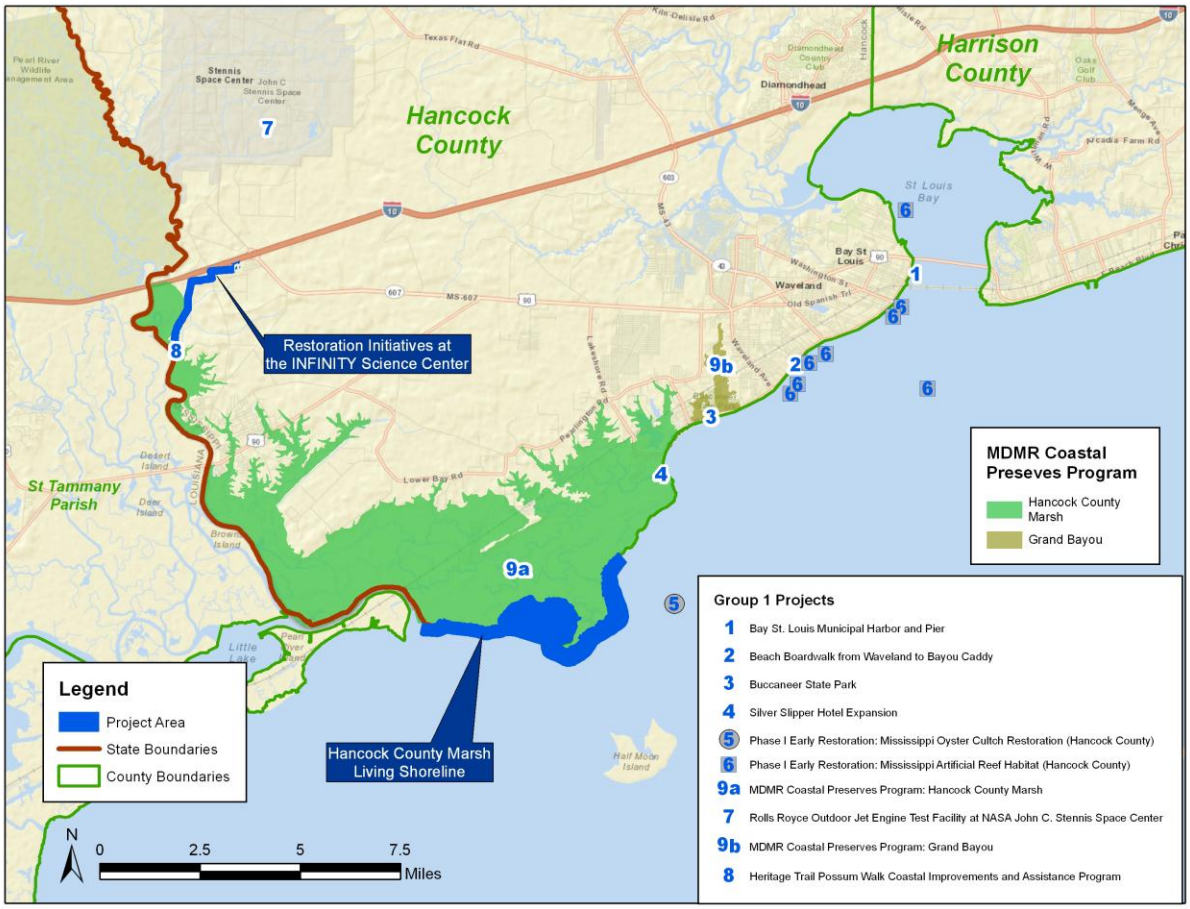

Figure 10-21. Group 1 Projects for Cumulative Effects Analysis.

Table 10-37. Description of past, present, and reasonably foreseeable future actions that have been considered as part of this analysis for Group 1 projects.

Category/Projects	Project Description	Key Resource Areas with Potential for Cumulative Impacts
Restoration Related to the Spill (Early Restoration Phases I & II, Restore Act, Gulf Environmental Benefit Fund, North American Wetlands Conservation Fund, National Academy of Sciences)		
Phase I Early Restoration: Mississippi Oyster Cultch Restoration (Hancock County)	This project restored and enhanced approximately 1,430 acres of oyster cultch areas that cover approximately 12,000 acres of the Mississippi Sound. The initial cultch placement was completed in May of 2013.	Short-term to long-term impacts to: • geology and substrates • hydrology and water resources • living coastal and marine resources Long-term benefits to: • geology and substrates, • living coastal and marine resources • habitats • socioeconomic benefits
Phase I Early Restoration: Mississippi Artificial Reef Habitat (Hancock County)	This project deployed cultch among 67 nearshore artificial reefs, each deployment was approximately 0.5 to 3 acres, in the marine waters of Mississippi. Within Group 1 there are 8 artificial reefs. The project was completed in June of 2013.	Short-term to long-term impacts to: • geology and substrates • living coastal and marine resources Long-term benefits to: • geology and substrates • hydrology and water resources • living coastal and marine resources • habitats • socioeconomic benefits
Mississippi Department of Marine Resources Beneficial Use of Dredge Material Program (Marsh Creation)	The project includes using dredge material to restore habitats such as marsh and wetland habitat.	Short-term to long-term impacts to: • geology and substrates, • hydrology and water resources • living coastal and marine resources • habitat Long term benefits to: • geology and substrates • living and coastal marine resources • habitats
Military Operations		
Rolls Royce Outdoor Jet Engine Test Facility at NASA John C. Stennis Space Center	The project is an expansion of an existing facility and includes the construction of a second outdoor jet engine test stand. The test stand was completed in October 2013.	Short-term to long-term impacts to: • noise • air quality and GHGs Long-term benefits: • socioeconomic benefits
Marine Transportation		
Bay St. Louis Municipal Harbor and Pier	Harbor and pier expansion. The Harbor is currently being constructed with 163 slips, including 12 ADA accessible slips, sizes ranging from 35' to 60'. Dredge material from the basin was used to expand the existing beach north of the pier from 150' to 250'.	Short to long-term impacts to: • geology and substrates • air quality and GHGs • hydrology and water resources • noise • living coastal and marine resources • air quality Long-term benefits to: • recreational use • infrastructure • socioeconomic benefits
Energy Activities (Offshore oil production, Offshore Natural Gas Facilities, State Oil and Gas Activities)		
No known projects.		
Marine Mineral Mining, Including Sand and Gravel Mining		
No known projects		
Coastal Development and Land Use		
Silver Slipper Hotel Expansion	This includes 142-room Hotel construction to be completed in December of 2014.	Short to long-term impacts to: • geology and substrates

Category/Projects	Project Description	Key Resource Areas with Potential for Cumulative Impacts
		• hydrology and water resources • noise • air quality and GHGs • habitats Long-term benefits: • tourism and recreational use • socioeconomic benefits
Mississippi Department of Marine Resources Coastal Preserves Program[14] a.Hancock County Marsh Preserve b. Grand Bayou	The project includes the general management, regulation, recreation, and restoration activities in MDMR areas	Short-term minor adverse impacts to: • habitats Long term benefits to: • habitats • protected species • living coastal and marine resources
Fisheries and Aquaculture		
No known projects		
Tourism and Recreation		
Beach Boardwalk from Waveland to Bayou Caddy	Boardwalk construction	Short to long-term impacts to: • geology and substrates • habitats Long-term benefits to: • recreational use • infrastructure • socioeconomic benefits
Buccaneer State Park	Hurricane Katrina destroyed all of Buccaneer State Park's structures, waterpark and support facilities. The park has been under varying stages of reconstruction since Hurricane Katrina. The final phase of reconstruction was completed in November of 2013.	Short to long-term impacts to: • geology and substrates • noise • habitats Long-term benefits to: • tourism and recreational use • socioeconomic benefits
Heritage Trail Possum Walk Coastal Improvements and Assistance Program	This project improves recreational improvements and trail improvements including a boardwalk and a kayak launch.	Short to long-term impacts to: • geology and substrates • habitats Long-term benefits to: • tourism and recreational use • infrastructure

10.10.3.1 Cumulative Impacts Analysis for Group 1 Projects

Looking across the array of current and reasonably foreseeable future projects, Table 10-38 identifies the following resource categories where there is a possibility that impacts of present and reasonably foreseeable future actions might overlap those of the Group 1 Phase III Early Restoration projects and therefore result in adverse cumulative impacts not identified through analysis of Group 1 Phase III Early Restoration projects alone. The following resource categories are identified for further cumulative impacts analysis:

[14] Present and foreseeable projects in this analysis refers to the on-going Mississippi Department of Marine Resources Coastal Preserves Program; does not include projects funded with National Fish and Wildlife Foundation funded from the Gulf Environmental Benefit Fund.

- Geology and substrates
- Hydrology and water resources
- Air quality
- Noise
- Living coastal and marine resources
- Habitat
- Socioeconomics and Environmental Justice
- Tourism and recreational use
- Infrastructure

Cumulative impacts for each of these categories are discussed below.

Geology and Substrates

Group 1 Phase III Early Restoration projects would have long term minor to moderate impacts to geology and substrates resulting from filling of soft sediments and hard bottom substrates for breakwaters, marsh creation, high profile reefs and , the construction of temporary flotation channels for the Hancock County Marsh Living Shoreline Project (Table 10-36). There would be minor impacts to geology and substrates for construction of trails, paving of parking areas, pile installation in wetlands for the construction of education facilities, and grading of the Native Landscape area. Long-term benefits to geology and substrates would include the conversion of hard bottom substrate to reefs, the conversion of soft sediments to a living shoreline (reef), and marsh creation.

Eight projects (Phase I Early Restoration: Mississippi Oyster Cultch Restoration, Phase I Early Restoration: Mississippi Artificial Reef Habitat, Mississippi Department of Marine Resources Beneficial Use of Dredge Material Program, Bay St. Louis Municipal Harbor and Pier, Silver Slipper Hotel Expansion, Beach Boardwalk from Waveland to Bayou Caddy, Buccaneer State Park, and Heritage Trail Possum Walk Coastal Improvements and Assistance Program;**Error! Reference source not found.**) are identified as potential contributors to cumulative impacts (adverse and beneficial) on geology and substrates when their impacts are combined with those of the Group 1 Phase III Early Restoration projects. Harbor, pier and boardwalk installations would include the conversion of soils and sediment to hard structure varies for each project. The projects would have a relatively small footprint for conversion of soil and substrate to hard structure. Restoration projects (Phase I Early Restoration: Mississippi Oyster Cultch Restoration, Phase I Early Restoration: Mississippi Artificial Reef Habitat) would enhance remnant hard bottom habitat and eventually would be colonized to produce reefs which provide an ecological benefit. Beneficial Use projects would have included minor impacts to sediments from dredging, but proper placement will provide marsh benefits.

When Group 1 Phase III Early Restoration projects are analyzed in combination with other past present, and reasonably forseeable future actions, short and long-term cumulative adverse impacts to geology and substrates would likely occur. Group 1 Phase III early restoration projects would not contribute substantially to cumulative adverse impacts. Group 1 Phase III Early Restoration projects, carried out in conjunction with other restoration efforts have the potential to result in some long-term beneficial cumulative impacts to geology and substrates.

Hydrology and Water Resources

Group 1 Phase III Early Restoration projects would result in short term minor construction related impacts to water quality for turbidity increases from cultch placement, breakwater construction, marsh creation, and grading and filling related to recreational use facilities(Table 10-36). There would be long-term beneficial impacts related to marsh and reef creation.

Six projects (Phase I Early Restoration: Mississippi Oyster Cultch Restoration, Phase I Early Restoration: Mississippi Artificial Reef Habitat, Mississippi Department of Marine Resources Beneficial Use of Dredge Material Program, Bay St. Louis Municipal Harbor and Pier, Silver Slipper Hotel Expansion and Buccaneer State Park;**Error! Reference source not found.**) are identified as potential contributors to cumulative impacts (adverse and beneficial). These restoration, marine transportation, coastal development, and tourism/recreation activities may contribute to long-term hydrologic or water quality impacts. Water quality impacts are primarily from turbidity as a result of deployment of cultch (Oyster cultch, artificial reefs), sediment placement (beneficial use), and soil and sediment disturbance (harbor and pier construction; casino construction). Other water quality impacts include pollutants from construction or those carried in runoff from marine transportation, coastal development, and tourism and recreation facility operations after construction. Oyster reefs and artificial reefs contribute long term water quality benefit from biological filtering. Long-term beneficial impacts are anticipated from marshes that are created by beneficial use of dredge materials.

When Group 1 Phase III Early Restoration projects are analyzed in combination with other past present, and reasonably forseeable future actions, short and long-term cumulative adverse impacts to hydrology and water resources (water quality) would likely occur. However, Group 1 Phase III Early Restoration projects would not contribute substantially to cumulative adverse impacts. Group 1 Phase III Early Restoration projects, carried out in conjunction with other restoration efforts have the potential to result in some long-term beneficial cumulative impacts to hydrology and water resources (water quality).

Air Quality and GHGs

Group 1 projects Phase III Early Restoration projects would result in short-term, minor construction related impacts for construction (equipment operation) of the Hancock County Marsh Living Shorelines project and Restoration Initiatives at the INFINITY Science Center(Table 10-36).

Three projects (Rolls Royce Outdoor Jet Engine Test Facility, Bay St. Louis Municipal Harbor and Pier and Silver Slipper Hotel Expansion; **Error! Reference source not found.**) are identified as potential contributors to cumulative impacts to air quality or GHG impacts. The impacts would occur mainly during construction with limited long term operational impacts. Construction and operations impacts of each project would be short to long-term in nature, would constitute a very small portion of the overall inventory of air emissions in the region, and would not be expected to violate state or federal standards. For operations, all facilities, would follow applicable federal and state regulations, and would not be expected to change the air quality attainment status of the region.

When Group 1 Phase III Early Restoration projects are analyzed in combination with other past present, and reasonably forseeable future actions, short-term cumulative adverse air quality impacts would likely occur. However, Group 1 Phase III Early Restoration projects would not contribute substantially to cumulative adverse air quality impacts.

Noise

Group 1 Phase III Early Restoration projects would have short-term construction-related noise impact. In addition, there would be sporadic short-term operational noise impact due to increase visitor use of remote trail section (Table 10-36).

Five projects (Rolls Royce Outdoor Jet Engine Test Facility at NASA John C. Stennis Space Center, Bay St. Louis Municipal Harbor and Pier, Silver Slipper Hotel Expansion, Beach Boardwalk from Waveland to Bayou Caddy, and Buccaneer State Park; **Error! Reference source not found.**) are identified as potential contributors to cumulative impacts including increases in noise levels. Project types include military operations, marine transportation, coastal development, and tourism/recreation. In most cases, the noise impacts would be of relatively short duration--ending upon completion of construction activities--and are projected to result in only minor adverse impacts. Noise levels for facility operations and use will be increased but not at an excessive level given surrounding land use.

When Group 1 Phase III Early Restoration projects are analyzed in combination with other past present, and reasonably forseeable future actions, short-term cumulative adverse noise impacts would likely occur. Group 1 Phase III Early Restoration projects would not contribute substantially to cumulative adverse noise impacts.

Living Coastal and Marine Resources

Group 1 Phase III Early Restoration projects would have short term adverse impacts to benthic fauna and long-term beneficial impacts to living coastal and marine resources resulting from the construction of the Hancock County Marsh Living Shorelines breakwater, oyster reef, and marsh creation (Table 10-36).

Four projects (Phase I Early Restoration: Mississippi Oyster Cultch Restoration, Phase I Early Restoration: Mississippi Artificial Reef Habitat, Mississippi Department of Marine Resources Beneficial Use of Dredge Material Program, Mississippi Coastal Preserves, Bay St. Louis Harbor and Municipal Pier; **Error! Reference source not found.**) are identified as potential contributors to cumulative impacts (adverse and beneficial) to living coastal and marine resources. Project types include restoration projects, marine transportation, and coastal land use (preservation). There would be minor short-term adverse impacts to benthic fauna resulting from cultch deployment (Oyster and artificial reefs), beneficial use of dredge materials, and hard structure installed for coastal development. Long-term benefits are anticipated from reef and marsh creation which will provide will provide habitat for smaller organisms mainly consisting of crustaceans and mollusks, such as juvenile shrimp, crab, oysters and mussels that live on the reef and in the sediment.

When Group 1 Phase III Early Restoration projects are analyzed in combination with other past present, and reasonably forseeable future actions, short-term cumulative adverse impacts to living coastal and marine resources would likely occur. Group 1 Phase III Early Restoration projects would not contribute substantially to cumulative adverse impacts to living coastal and marine resources. Group 1 Phase III Early Restoration projects, carried out in conjunction with other restoration efforts have the potential to result in some long-term beneficial cumulative impacts to living coastal and marine resources.

Habitats

Group 1 Phase III Early Restoration projects would have short term minor construction-related habitat impacts. Hancock County Marsh would have impacts to benthic soft and hard bottom habitats, but would create long-term benefits from the conversion of these habitats to oyster reefs, high profile reefs and marsh. Restoration Initiatives at INFINITY Science Center would have short term minor impacts to wetlands and forested habitats from grading and temporary construction activities for trail paving. There would be no habitat fragmentation as a result of either project (Table 10-36).

Six projects (Phase I Early Restoration: Mississippi Oyster Cultch Restoration, Phase I Early Restoration: Mississippi Artificial Reef Habitat, Mississippi Department of Marine Resources Beneficial Use of Dredge Material Program, Beach Boardwalk from Waveland to Bayou Caddy, Buccaneer State Park, and Heritage Trail Possum Walk Coastal Improvements and Assistance Program;**Error! Reference source not found.**) are identified as potential contributors to cumulative adverse and beneficial impacts to habitat. Project types include restoration projects, coastal development/land use, and tourism/recreational use projects. Adverse impacts are anticipated to be due to the removal of vegetation (coastal use projects, recreational trails), potential habitat fragmentation due to the installation of trails or boardwalks, filling of benthic habitat during construction (restoration and coastal use projects) and from management activities on preserves (ie prescribed burns, physical and chemical removal of nuisance species). The impacts will be short to long term but minor and will be mitigated through use of BMPs. Restoration projects (Phase I Early Restoration: Mississippi Oyster Cultch Restoration, Phase I Early Restoration: Mississippi Artificial Reef Habitat) resulted in the enhancement of and benefits to habitats including oyster reefs and nearshore hard bottom habitat. Benefits to marsh (beneficial use) and coastal wetland habitat (preservation and management) are anticipated from these projects.

When Group 1 Phase III Early Restoration projects are analyzed in combination with other past present, and reasonably forseeable future actions, short-term cumulative adverse impacts to habitat would likely occur. However, Group 1 Phase III Early Restoration projects would not contribute substantially to cumulative adverse impacts to habitats. Group 1 Phase III Early Restoration projects, carried out in conjunction with other restoration efforts have the potential to result in some long-term beneficial cumulative impacts to habitats.

Socioeconomic and Environmental Justice

Group 1 Phase III Early Restoration projects would have a short and long term beneficial socioeconomic impacts related to construction and on-going operations (Table 10-36). The Restoration Initiatives at INFINITY Science Center would collect revenue for Science Center visitor fees. Hancock County Marsh Living Shorelines could provide beneficial socioeconomic impacts due to spending related to increased fishing, birding and other activities in the project area.

Seven projects (Phase I Early Restoration: Mississippi Oyster Cultch Restoration, Phase I Early Restoration: Mississippi Artificial Reef Habitat, Rolls Royce Outdoor Jet Engine Test Facility, Bay St. Louis Municipal Harbor and Pier, Silver Slipper Hotel Expansion, Beach Boardwalk from Waveland to Bayou Caddy, and Buccaneer State Park;**Error! Reference source not found.**) are identified as potential contributors to cumulative impacts (beneficial) when their impacts are combined with those of the Group 1 projects. Restoration projects, military operations, coastal development, and

tourism/recreation projects would contribute to socioeconomic benefit from job creation and spending resulting from enhanced tourism and recreation activities in the area.

When Group 1 Phase III Early Restoration projects are analyzed in combination with other past present, and reasonably forseeable future actions, there would be no adverse socioeconomic impacts. Group 1 Phase III Early Restoration projects would not contribute substantially to cumulative adverse socioeconomic impacts. Group 1 Phase III Early Restoration projects, carried out in conjunction with other projects have the potential to result in some long-term beneficial cumulative socioeconomic impacts.

Tourism and Recreation

Group 1 Phase III Early Restoration projects would provide benefits to tourism and recreation. Restoration Initiatives at the INFINITY Science Center would provide recreational benefits from enhancements to the Science Center and trails in the area (Table 10-36). There could be short-term, minor impacts (e.g. noise, litter) due to increased visitor use.

Four projects (Silver Slipper Hotel Expansion, The Beach Boardwalk from Waveland to Bayou Caddy, Buccaneer State Park, and the Heritage Trail Possum Walk Coastal Improvements and Assistance Program;**Error! Reference source not found.**) are identified as potential contributors to cumulative impacts (primarily beneficial) to tourism and recreation. Visitation to these improved facilities is expected to provide long-term beneficial impacts to tourism are and recreation.

When Group 1 Phase III Early Restoration projects are analyzed in combination with other past present, and reasonably forseeable future actions, there are no short-term cumulative adverse impacts to tourism and recreation. Group 1 Phase III Early Restoration projects would not contribute substantially to cumulative adverse impacts to tourism and recreation. Group 1 Phase III Early Restoration projects, carried out in conjunction with other projects have the potential to result in some long-term beneficial cumulative impacts to tourism and recreation.

Infrastructure

Group 1 Phase III Early Restoration projects would provide infrastructure benefits. Restoration Initiatives at INFINITY Science Center would have beneficial impacts on infrastructure with creation of trails and parking (Table 10-36).

Three projects (Bay St. Louis Municipal Harbor and Pier, Beach Boardwalk from Waveland to Bayou Caddy, and Heritage Trail-Possum Walk Coastal Improvements and Assistance Program;**Error! Reference source not found.**) are identified as potential contributors to cumulative impacts (beneficial) when their impacts are combined with those of the Group 1 Phase III Early Restoration projects. These marine transportation and recreation projects would contribute to infrastructure including improvements to a municipal pier, and construction of trails and boardwalks. Infrastructure benefits resulting from these projects are anticipated to be long-term.

When Group 1 Phase III Early Restoration projects are analyzed in combination with other past present, and reasonably forseeable future actions, there would be no adverse impacts to infrastructure. Group 1 Phase III would not contribute substantially to cumulative adverse impacts to infrastructure. Group 1

Phase III Early Restoration projects, carried out in conjunction with other projects have the potential to result in some long-term beneficial cumulative impacts to infrastructure.

Summary of Cumulative Impacts

Based on the above analysis of present and reasonably foreseeable future actions and the anticipated resources to be impacted for these actions the Group 1 Phase III Early Restoration projects are not expected to have long-term cumulative impacts that differ substantially from those identified in the environmental review for the project. Group 1 Phase III Early Restoration projects, carried out in conjunction with other projects, have the potential to result in long term beneficial cumulative impacts to geology and substrates, living coastal and marine resources, habitats, socioeconomics, tourism, recreational use and infrastructure in the region.

10.10.4 Group 2: Harrison and Jackson Counties: Popp's Ferry Causeway Park/Pascagoula Beachfront Promenade

Error! Reference source not found. summarizes the impacts to resources associated with proposed Mississippi Early Restoration projects in the Harrison and Jackson counties region for the Popp's Ferry Causeway Park and the Pascagoula Beachfront Promenade, which are recreational use projects. The projects occur in Back Bay Biloxi and in Pascagoula adjacent to the Mississippi Sound. Phase III Early Restoration projects are evaluated together to determine if they have any cumulative effects that, when combined with other past, present, and reasonably foreseeable actions in the Group 2 area, may result in cumulative effects to resources. Cultural resource investigations and consultations would be completed for all the proposed projects as environmental review continues. Although no cumulative impacts to cultural resources are anticipated, there is insufficient information at this time to make determinations. If cultural resources would be impacted, mitigation identified during the consultation process would be implemented.

Existing Conditions

Existing environmental and socio-economic conditions in and around Group 2 Phase III Early Restoration projects are represented by the affected environment in the preceding environmental reviews. The existing conditions include the environmental impacts of past projects in the area and therefore are the assumed existing conditions for the cumulative analysis of impacts for present and reasonably foreseeable future actions.

Table 10-38. Summary of Impacts of Proposed Phase III Early Restoration Projects-Popp's Ferry Causeway Park and the Pascagoula Beachfront Promenade.

Group 2	Geology and Substrates	Hydrology and Water Resources	Air Quality and GHGs	Noise	Living Coastal and Marine Resources	Protected Species	Habitats	Socioeconomics and Environmental Justice	Land and Marine Management	Aesthetics and Visual Resources	Tourism and Recreational Use	Infrastructure	Public Health and Safety and Shoreline Protection
Popp's Ferry Causeway Park	-	-	S	s	-	NE	-	+	+	+	+	+	+
Pascagoula Beachfront Promenade	-	-	S	s	NE	NE	NE	+	+	+	+	+	+
- Represents an adverse impact; + represents a beneficial impact; s represents a short-term adverse impact; NE represents no effect													

Summary of Impacts Group 2 Phase III Early Restoration Projects

All of the resource areas listed in **Error! Reference source not found.** above would be affected by at least some of the Phase III Early Restoration projects included in Group 2. These effects would not be anticipated to extend beyond the construction period for the most part. Some resource areas would be affected long term, some beneficially and some adversely. However, none of the Phase III Early Restoration projects included in Group 2 would result in any long-term adverse effects that rise above a minor status. In fact, for many of the resource, Phase III Early Restoration projects in Group 2 would result in long-term benefits to certain resources. Overall, long-term benefits from projects Phase III Early Restoration proposed in the Group 2 region are expected to outweigh the short-term adverse impacts necessary for project implementation as well as long-term minor adverse effects.

Identification of Past, Present and Reasonably Foreseeable Future Actions and Impacts

Past, present, and reasonably foreseeable activities in Group 2 have contributed to adverse cumulative effects to certain resources. Group 2 projects in Harrison and Jackson counties include infrastructure, marine transportation, energy, and restoration and environmental stewardship activities with various types of adverse impacts as well as benefits. Figure 10-22 displays the past, present, and reasonably foreseeable future activities.

The table below identifies past, present and reasonably foreseeable future projects in each of the categories described in Chapter 6. For each of the actions, the table provides (1) a brief description of the action and (2) a listing of NEPA resource categories that are the most likely areas of concern for cumulative impacts when the action is considered in conjunction with implementation of the Group 2 Phase III Early Restoration projects. In most cases, detailed environmental impact data are not available for these actions. Consequently, the analyses generally reflect qualitative discussions about potential impacts based on best professional judgment. Also, as noted previously, the focus of the cumulative

impacts analysis is on the resource areas that are deemed most likely to exhibit cumulative impacts; hence the analysis does not include in the listing those resources where impacts have been judged to be *de minimis.*

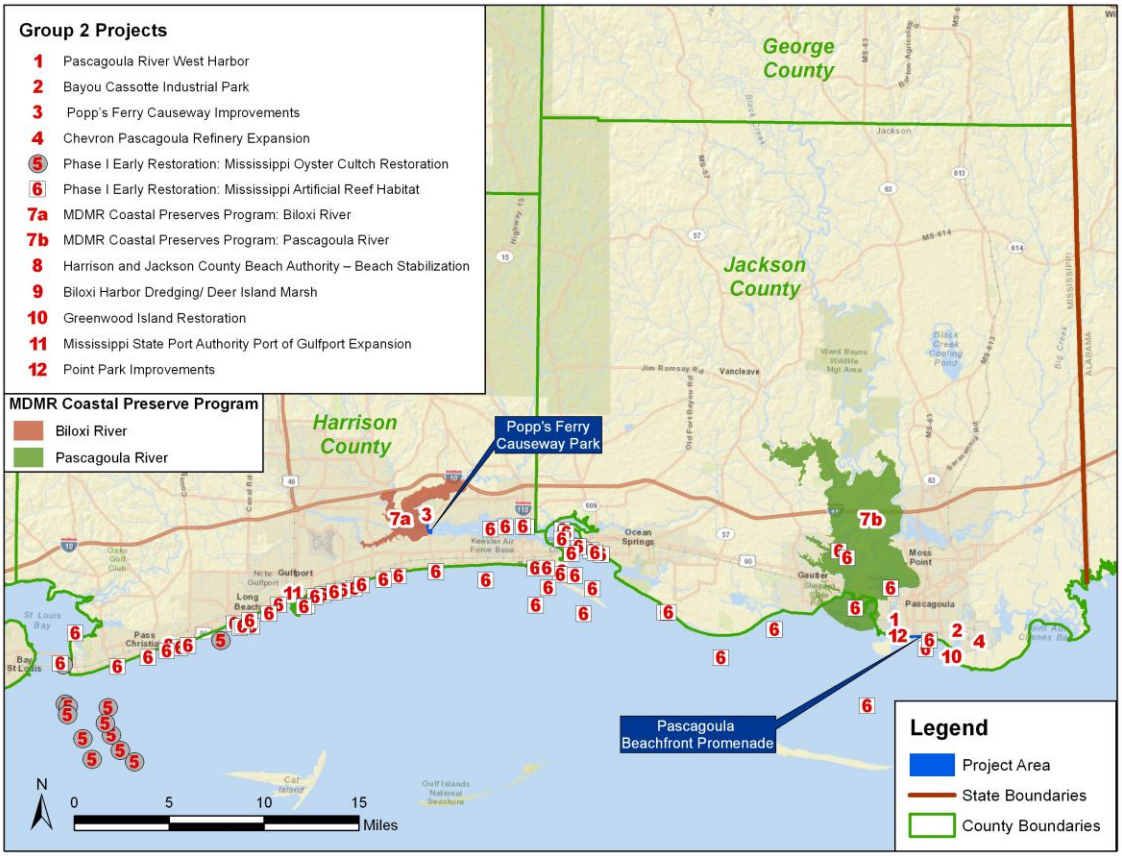

Figure 10-22. Group 2 Projects for the Cumulative Effects Analysis.

Table 10-39. Description of past, present, and reasonably foreseeable future actions that have been considered as part of this analysis for Group 2 projects.

Category/Projects	Project Description	Key Resource Areas with Potential for Cumulative Impacts
Restoration Related to the Spill (Early Restoration Phases I & II, Restore Act, Gulf Environmental Benefit Fund, North American Wetlands Conservation Fund, National Academy of Sciences)		
Phase I Early Restoration: Mississippi Oyster Cultch Restoration (Hancock County)	This project restored and enhanced approximately 1,430 acres of oyster cultch areas that cover approximately 12,000 acres of the Mississippi Sound. Initial cultch placement was completed in May of 2013.	Short-term to long-term impacts to: • geology and substrates • hydrology and water resources • living coastal and marine resources Long-term benefits to: • geology and substrates, • living coastal and marine resources • habitats • socioeconomic benefits
Phase I Early Restoration: Mississippi Artificial Reef Habitat (Hancock County)	This project deployed cultch among 67 nearshore artificial reefs, each deployment was approximately 0.5 to 3 acres, in the marine waters of Mississippi. Within Group 2 there are 59 artificial reefs. Cultch deployment was completed in June of 2013.	Short-term to long-term impacts to: • geology and substrates • living coastal and marine resources Long-term benefits to: • geology and substrates • hydrology and water resources • living coastal and marine resources • habitats • socioeconomic benefits
Mississippi Department of Marine Resources Beneficial Use of Dredge Material Program (Marsh Creation)	The project includes using dredge material to restore habitats such as marsh and wetland habitat.	Short-term to long-term impacts to: • geology and substrates, • hydrology and water resources • noise • living coastal and marine resources • habitat Long term benefits to: • geology and substrates • living and coastal marine resources • habitats
Military Operations		
No known projects		
Marine Transportation		
Pascagoula River West Harbor (dredging and Industrial expansions)	Harbor dredging and expansion of industrial facilities.	Short to long-term impacts to: • geology and substrates, • hydrology and water resources • air quality and GHGs • noise • living coastal and marine resources • habitats Long-term benefits to: • socioeconomic benefits • infrastructure
Biloxi Harbor Dredging/ Deer Island Marsh	Material dredged from Biloxi Harbor were used to create 45 acres of marsh adjacent to Deer Island. Approximately 364,000 cubic yards of fine-grained dredged material was used to create the marsh. The project was completed in 2003.	Short-term to long-term impacts to: • geology and substrates, • hydrology and water resources • noise • living coastal and marine resources • habitats Long-term benefits to: • habitats

Category/Projects	Project Description	Key Resource Areas with Potential for Cumulative Impacts
Mississippi State Port Authority Port of Gulfport Expansion	The proposed project involves filling of up to 300 acres of open water bottom in the Mississippi Sound; construction of terminal facilities and associated infrastructure, dredging and dredged material disposal and infrastructure; and construction of a breakwater of approximately 4,000 linear feet as well as elevating the expanded facility 25 feet above sea level to provide protection against future tropical storm surge events. Project completion is estimated to be late 2016.	Short-term to long-term impacts to: • geology and substrates • hyrology and water resources • air quality and GHGs • noise • living coastal and marine resources • habitats There would be long-term benefits to: • socioeconomics • infrastructure
Energy Activities (Offshore oil production, Offshore Natural Gas Facilities, State Oil and Gas Activities)		
Chevron Pascagoula Refinery Expansion	An ethane cracker will be built at Chevron Phillips Chemical's Cedar Bayou plant in Baytown and two polyethylene units will be built at a site in Old Ocean, near Chevron Phillips Chemical's Sweeny plant. Construction is expected to start in early 2014 with startup slated for 2017.	Short to long-term impacts to: • geology and substrates • hydrology and water resources • air quality and GHGs • noise • habitat Long-term benefits: • socioeconomics
Marine Mineral Mining, Including Sand and Gravel Mining		
No known projects		
Coastal Development and Land Use		
Bayou Cassotte Industrial Park (Channel Widening, dredging, Industrial Expansions)	Channel widening project, channel dredging, and industrial facilities expansion	Short to long-term impacts to: • geology and substrates • hydrology and water resources • air quality • noise • living and coastal marine resources • habitat Long-term benefits to: • socioeconomics • infrastructure
Mississippi Department of Marine Resources Coastal Preserves Program[15]	The project includes the general management, regulation, recreation, and restoration activities in MDMR areas	Short-term minor adverse impacts to: • habitats Long term benefits to: • habitats • protected species • living coastal and marine resources
Fisheries and Aquaculture		
No known projects		
Tourism and Recreation		
Harrison and Jackson County Beach Authority – Beach Stabilization	This project consists of the restoration of approximately 26 miles of dune systems, which was destroyed by Hurricane Katrina. Restoration would consist of placement of approximately 681,000 cubic yards of dune sand, fencing along a 134,000-foot-long perimeter, to offer protection to the resource, and approximately 125 acres of	Short-term to long-term impacts to: • geology and substrates • hydrology and water resources • noise • habitats Long-term benefits to: • habitat

[15] Present and foreseeable projects in this analysis refers to the on-going Mississippi Department of Marine Resources Coastal Preserves Program; does not include projects funded with National Fish and Wildlife Foundation funded from the Gulf Environmental Benefit Fund.

Category/Projects	Project Description	Key Resource Areas with Potential for Cumulative Impacts
	native vegetation plantings.	
Point Park	A 10-acre tract overlooking the Mississippi Sound would be converted to a park. Current construction includes parking, restrooms, amphitheater and boat launch. Future plans include additional parking, restrooms, rip-rap, boardwalks, lighting, landscaping, ramp improvements, pavilions, a playground, a stage and other features.	Short term impacts to: • geology and substrates • hydrology and water resources • noise Long-term benefits to: • recreational use • socioeconomics • infrastructure
Greenwood Island Restoration	Restoration activities on Greenwood island	Short-term to long-term impacts to: • geology and substrates • hydrology and water resources • noise • habitats Long-term benefits to: • habitats

10.10.4.1 Cumulative Impacts Analysis for Group 2 Projects

Looking across the array of present and reasonably foreseeable future projects, Table 10- identifies the following resources where there is a possibility that impacts of present and reasonably foreseeable future actions might overlap those of the Group 2 Phase III Early Restoration projects and therefore result in adverse cumulative impacts not identified through analysis of Group 2 Phase III Early Restorationprojects alone. The following resource categories are identified for further cumulative impacts analysis:

- Geology and substrates
- Hydrology and water resources
- Air quality and GHGs
- Noise
- Living coastal and marine resources
- Habitats
- Tourism and recreation
- Infrastructure

Cumulative impacts for each of these categories are discussed below.

Geology and Substrates

Group 2 Phase III Early Restoration projects would have long-term minor impacts to geology and substrates from the permanent filling of sediments and soils to construct boardwalks, walkways, promenades, fishing piers, parking lots, visitor centers and amenities (**Error! Reference source not found.**).

Eleven projects (Phase I Early Restoration: Mississippi Oyster Cultch Restoration, Phase I Early Restoration: Mississippi Artificial Reef Habitat, Mississippi Department of Marine Resources Beneficial Use of Dredge Material Program, Pascagoula River West Harbor, Biloxi Harbor Dredging/ Deer Island Marsh, Mississippi State Port Authority Port of Gulfport Expansion, Chevron Pascagoula Refinery

Expansion, Bayou Cassotte Industrial Park, Harrison and Jackson County Beach Authority – Beach Stabilization, Point Park and Greenwood Island Restoration; Table 10-) are identified as potential contributors to cumulative impacts on geology and substrates when their impacts are combined with those of the Group 2 Phase III Early Restoration projects. Geology and substrate impacts resulting from these projects would include dredge activity displacement of soft bottom sediments for port and harbor improvements and filling associated with industrial projects, energy projects and beach stabilization projects. These impacts are anticipated to be short- to long-term, minor to moderate adverse, but localized. Restoration projects (Phase I Early Restoration: Mississippi Oyster Cultch Restoration, Phase I Early Restoration: Mississippi Artificial Reef Habitat) would enhance remnant hard bottom habitat and eventually would be colonized to produce reefs which provide an ecological benefit. Beneficial Use projects would have included minor impacts to sediments from dredging, but proper placement will provide marsh benefits. Long term benefits would result from beach stabilization activities.

Group 2 Phase III Early Restoration projects in combination with other past, present, and reasonably foreseeable future actions, would result in long-term cumulative adverse impacts to geology and substrates. Group 2 Phase III Early Restoration projects would not contribute substantially to cumulative adverse impacts. Group 2 Phase III Early Restoration projects, carried out in conjunction with other restoration efforts have the potential to result in some long-term beneficial cumulative impacts to geology and substrates.

Hydrology and Water Resources

Group 2 Phase III Early Restoration projects would result in short-term minor impacts to hydrology and water resources. Impacts would include construction related increases in stormwater runoff as well as impacts to water quality from construction related runoff related to construction of trails, an interpretive center, parking and other facilities (Table 10-).

Eleven projects (Phase I Early Restoration: Mississippi Oyster Cultch Restoration, Phase I Early Restoration: Mississippi Artificial Reef Habitat, Mississippi Department of Marine Resources Beneficial Use of Dredge Material Program, Pascagoula River West Harbor, Biloxi Harbor Dredging/ Deer Island Marsh, Mississippi State Port Authority Port of Gulfport Expansion, Chevron Pascagoula Refinery Expansion, Bayou Cassotte Industrial Park, Harrison and Jackson County Beach Authority – Beach Stabilization, Point Park, and Greenwood Island Restoration; Table 10-39) are identified as potential contributors to cumulative impacts on hydrology and water resources when their impacts are combined with those of the Group 2 Phase III Early Restoration projects. Water quality impacts are primarily from turbidity as a result of deployment of cultch (Oyster cultch, artificial reefs), sediment placement (beneficial use), and soil and sediment disturbance (harbor and pier construction; dredging). Other water quality impacts include pollutants from construction or those carried in runoff from (marine transportation, coastal development, and tourism and recreation facility operations after construction). Oyster reefs and artificial reefs contribute long-term water quality benefit from biological filtering. Long-term beneficial impacts are anticipated from marshes that are created by beneficial use of dredge materials.

Group 2 Phase III Early Restoration projects in combination with other past, present, and reasonably foreseeable future actions, would result in long-term cumulative adverse impacts to hydrology and water resources. Group 2 would not contribute substantially to cumulative adverse impacts to

hydrology and water resources. Group 2 Phase III Early Restoration projects, carried out in conjunction with other restoration efforts have the potential to result in some long-term beneficial cumulative impacts to hydrology and water resources (water quality).

Air Quality and GHGs

Group 2 Phase III Early Restoration projects would have short-term minor construction related air impacts due to related to equipment use (Table 10-38).

Four projects (Pascagoula River West Harbor, Mississippi State Port Authority Port of Gulfport Expansion, Chevron Pascagoula Refinery Expansion, and Bayou Cassotte Industrial Park; Table 10-39) are identified as potential contributors to cumulative impacts to air quality or GHG impacts. The impacts would occur mainly during construction with some contribution likely from additional operations that result from facility expansion. Construction and operations impacts of each project would be short to long-term in nature, would constitute a very small portion of the overall inventory of air emissions in the region, and would not be expected to violate state or federal standards.

Group 2 Phase III Early Restoration projects in combination with other past, present, and reasonably foreseeable future actions, would have minor short-term to long-term cumulative adverse impacts to air quality. However, Group 2 would not contribute substantially to cumulative adverse air quality impacts.

Noise

Group 2 Phase III Early Restoration projects would have minor, short-term construction related noise impacts from the construction of fishing piers, walkways, road improvements, interpretive center construction, construction of a beach promenade and other facilities (Table 10-38). There would be sporadic, short term increases in noise due to visitor use.

Eight projects (Mississippi Department of Marine Resources Beneficial Use of Dredge Material Program, Pascagoula River West Harbor, Biloxi Harbor Dredging/ Deer Island Marsh, Mississippi State Port Authority Port of Gulfport Expansion, Chevron Pascagoula Refinery Expansion, Bayou Cassotte Industrial Park, Harrison and Jackson County Beach Authority – Beach Stabilization, Point Park, and Greenwood Island Restoration; Table 10-39) are identified as potential contributors to cumulative impacts including increases in noise levels. In most cases, the noise impacts would be of relatively short duration(ending upon completion of construction activities) and are projected to result in only minor adverse impacts. Operations noise could result from increased activities from facility expansions and visitor use of marine transportation, energy, coastal development, and tourism/recreation projects and could result in a long-term minor impact to noise. Recreational projects could result in increased visitor use and sporadic, short term increases in noise.

Group 2 Phase III Early Restoration projects in combination with other past, present, and reasonably foreseeable future actions, would result in short to long term cumulative adverse noise impacts. Group 2 Phase III Early Restoration projects would not contribute substantially to cumulative adverse noise impacts.

Living Coastal and Marine Resources

Group 2 Phase III Early Restoration projects would have minor, long term adverse affects to living coastal and marine resources from construction of piers, boardwalks and bank stabilization as well as enhanced access which could result in increases in bank fishing and crabbing (Popp's Ferry Causeway Park) in the area (Table 10-).

Eight projects (Phase I Early Restoration: Mississippi Oyster Cultch Restoration, Phase I Early Restoration: Mississippi Artificial Reef Habitat, and Mississippi Department of Marine Resources Beneficial Use of Dredge Material Program, Pascagoula River West Harbor, Biloxi Harbor Dredging/ Deer Island Marsh, Mississippi State Port Authority Port of Gulfport Expansion, Bayou Cassotte Industrial Park, and, Mississippi Department of Marine Resources Coastal Preserve Program; Table 10-39) are identified as potential contributors to cumulative impacts (adverse and beneficial) to living coastal and marine resources. Project types include restoration projects, marine transportation, and coastal land use (preservation). There would be minor to moderate short-term to long-term adverse impacts to benthic fauna resulting from cultch deployment (Oyster and artificial reefs), beneficial use of dredge materials, and hard structure installed for coastal development, and dredging operations associated with port and industrial and marine transportation projects. Reefs created by cultch deployment and marsh edge created by beneficial use will provide habitat for smaller organisms mainly consisting of crustaceans and mollusks, such as juvenile shrimp, crab, oysters and mussels that live on the reef, on marsh edge and in the sediment.

Group 2 Phase III Early Restoration projects in combination with other past, present, and reasonably foreseeable future actions, would result in short to long-term minor to moderate cumulative adverse impacts to living coastal and marine resources. However, Group 2 Phase III Early Restoration projects would not contribute substantially to cumulative adverse impacts to living coastal and marine resources. Group 2 Phase III Early Restoration projects, carried out in conjunction with other restoration efforts have the potential to result in some long-term beneficial cumulative impacts to living coastal and marine resources.

Habitats

Group 2 Phase III Early Restoration projects would have minor, short term impacts to habitat resulting from the construction of Popp's Ferry Causeway Park (Table 10-). Habitat impacts would include minor wetland impacts and impacts associated with shoreline stabilization with rip rap. There would be habitat fragmentation as a result of either project.

Eleven projects (Phase I Early Restoration: Mississippi Oyster Cultch Restoration, Phase I Early Restoration: Mississippi Artificial Reef Habitat, and Mississippi Department of Marine Resources Beneficial Use of Dredge Material Program, Pascagoula River West Harbor, Biloxi Harbor Dredging/ Deer Island Marsh, Mississippi State Port of Gulfport Expansion, Chevron Pascagoula Refinery Expansion, Bayou Cassotte Industrial Park, Mississippi Department of Marine Resources Coastal Preserves Program, Harrison and Jackson County Beach Authority – Beach Stabilization, and Greenwood Island Restoration; Table 10-39) are identified as potential contributors to cumulative adverse and beneficial impacts to various habitats. Project types include restoration projects, marine transportation, energy, coastal development/land use, and tourism/recreational use projects. Adverse impacts are anticipated to be due to the removal of vegetation (coastal use projects, recreational trails), filling/dredging of benthic habitat during construction (restoration, coastal development, marine transportation) and from

management activities on preserves (e.g. prescribed burns, physical and chemical removal of nuisance species). The impacts will be short to long term but minor and will be mitigated through use of BMPs. Implementation of restoration projects (Phase I Early Restoration: Mississippi Oyster Cultch Restoration, Phase I Early Restoration: Mississippi Artificial Reef Habitat, and Mississippi Department of Marine Resources Beneficial Use of Dredge Material Program) would result in the enhancement of and benefits to habitats including oyster reefs, nearshore hard bottom habitat (artificial reefs), marsh (beneficial use), island habitat and coastal wetland habitat (preservation and management).

Group 2 Phase III Early Restoration projects in combination with other past, present, and reasonably foreseeable future actions, would result in minor short to long-term cumulative adverse impacts to habitats. However, Group 2 Phase III Early Restoration projects would not contribute substantially to cumulative adverse habitat impacts. Group 2 Phase III Early Restoration projects, carried out in conjunction with other restoration efforts have the potential to result in some long-term beneficial cumulative impacts to habitats.

Socioeconomic and Environmental Justice

Group 2 Phase III Early Restoration projects would provide beneficial socioeconomic impacts due to increased expenditures related to enhanced access to the Popp's Ferry Park and Pascagoula Beachfront promenade (Table 10-38).

Eight projects (Phase I Early Restoration: Mississippi Oyster Cultch Restoration, Phase I Early Restoration: Mississippi Artificial Reef Habitat, Mississippi Department of Marine Resources Beneficial Use of Dredge Material Program, Pascagoula River West Harbor, Mississippi State Port Authority Port of Gulfport Expansion, Chevron Pascagoula Refinery Expansion, Bayou Cassotte Industrial Park, and Point Park; Table 10-39) are identified as potential contributors to cumulative impacts (beneficial) when their impacts are combined with those of the Group 2 Phase III Early Restoration projects. Restoration projects, marine transportation projects, coastal development, and tourism/recreation projects would contribute to socioeconomic benefit from job creation and revenues from enhanced tourism and recreation activities in the area. Socioeconomic benefits resulting from these projects are anticipated to be short- to long-term.

Group 2 Phase III Early Restoration projects in combination with other past, present, and reasonably foreseeable future actions, would not result in long-term cumulative adverse socioeconomic impacts. Group 2 would not contribute substantially to cumulative adverse socioeconomic impacts. Group 2 Phase III Early Restoration projects, carried out in conjunction with other projects have the potential to result in some long-term beneficial cumulative socioeconomic impacts.

Tourism and Recreation

Group 2 Phase III Early Restoration projects would result in beneficial impacts to tourism and recreation (Table 10-38). Project improvements would enhance access to coastal resources as well as visitor experience at those sites (Popp's Ferry Causeway Park and the Pascagoula Beachfront Promenade). There could be short-term minor impacts (e.g. noise, litter) due to increased visitor use.

The Point Park is identified as a potential contributor to cumulative impacts (beneficial) to tourism and recreational use (Table 10-). The project would provide long term benefits to the region.

Group 2 Phase III Early Restoration projects in combination with other past, present, and reasonably foreseeable future actions, would not result in cumulative adverse impacts to tourism and recreation. Group 2 Phase III Early Restoration projects would not contribute substantially to cumulative adverse impacts to recreation and tourism. Group 1 Phase III Early Restoration projects, carried out in conjunction with other projects have the potential to result in some long-term beneficial cumulative impacts to tourism and recreation.

Infrastructure

Group 2 Phase III Early Restoration projects would provide benefits to infrastructure (Table 10-). Popp's Ferry Causeway Park would include roadway improvements, parking, walkways, boardwalks, parking and other amenities. The Pascagoula Beachfront Promenade would provide pedestrian access to the Pascagoula Beach without pedestrians having to use Beach Boulevard.

Four projects (Pascagoula River West Harbor, Mississippi State Port Authority Port of Gulfport Expansion, Bayou Cassotte Industrial Park, and Point Park;Table 10-) are identified as potential contributors to cumulative impacts (beneficial) when their impacts are combined with those of the Group 2 Phase III Early Restoration projects. These marine transportation and recreation projects would contribute to infrastructure including improvements ports and harbors, and construction of parks, boat ramps and parking. Infrastructure benefits resulting from these projects are anticipated to be long-term.

Group 2 Phase III Early Restoration projects in combination with other past, present, and reasonably foreseeable future actions, would not result in cumulative adverse impacts to infrastructure. Group 2 Phase III Early Restoration projects would not contribute substantially to cumulative adverse impacts to infrastructure. Group 2 Phase III Early Restoration projects, carried out in conjunction with other project have the potential to result in some long-term beneficial cumulative impacts to infrastructure.

Summary of Cumulative Impacts

Analysis of present and reasonably foreseeable future actions and the anticipated resources to be impacted for these actions, the Group 2 Phase III Early Restoration projects are not expected to have long-term cumulative impacts that differ substantially from those identified in the environmental review for the project. Group 2 Phase III Early Restoration projects, carried out in conjunction with other projects have the potential to result in long term beneficial cumulative impacts to geology and substrates, hydrology and water resources, living and coastal marine resources, habitat, socioeconomics, tourism and recreational use, and infrastructure.

10.10.5 Other Planning Considerations

In addition to foreseeable actions identified in the table above, in November 2013, National Fish and Wildlife Foundation (NFWF) announced initial projects to receive funding from the Gulf Environmental Benefit Fund (http://www.nfwf.org/gulf/pages/gulf-projects.aspx). More than $112 million was obligated for 22 projects designed to protect, restore, and enhance natural and living resources across the Gulf Coast. Three of these projects are in Mississippi:

- Coastal Bird Stewardship Program
- Mississippi Coastal Preserve Program

- Coastal Stream & Habitat Initiative