CHAPTER 11: PROPOSED PHASE III EARLY RESTORATION PROJECTS: ALABAMA

11.1 Introduction

While all projects proposed to be implemented in Alabama are being put forth by the Trustees, the specifics of each project in this region are developed and brought to the Trustees for approval by "implementing trustees". For projects proposed to take place in Alabama, implementing Trustees for Phase III of Early Restoration are the State of Alabama (Gulf State Park Enhancement and Alabama Oyster Cultch Restoration) and NOAA (Swift Tract Living Shoreline). As discussed in Chapter 2 (see 2.1.3), each Trustee conducted an initial screening process to decide which projects to move forward to the Trustee Council for consideration as an Early Restoration project proposal. As an introduction to the projects proposed to be implemented in Alabama, these screening processes are described below.

11.2 Overall Restoration Approach for Alabama

The *Deepwater Horizon* (DWH) spill had a large impact on Alabama's natural resources and resulted in a concomitant loss of recreational services and ecological services provided by these natural resources. Alabama, along with the other states bordering the Gulf, is beginning a restoration process that includes projects designed to compensate for both ecological and recreational services losses. The Alabama Trustees received several hundred suggestions for Early Restoration projects as part of public comment processes implemented following the Spill. Although the detailed assessment of the injury is ongoing, the goal of Early Restoration is to provide meaningful benefits to restore lost services in the Gulf as quickly as practicable.

It is evident that several major categories of injury exist in Alabama, including loss of recreational services and injuries to shorelines and nearshore biota (e.g., marshes and oyster reefs). Impacts to these resources have been confirmed by preliminary work on the Assessment (see Chapter 4). In their project selection process, Alabama considered the project evaluation criteria listed in Chapter 2, and more specifically prioritized projects that would partially compensate for loss of resources by (1) constructing living shorelines that enhance nearshore productivity and provide coastal protection[1]; (2) restoring the productivity of historic oyster reefs and (3) addressing the very large losses of recreational services along the State's coastline. It is important to emphasize that Early Restoration represents only a starting point for restoration of injuries sustained as a result of this spill. When Alabama's injuries resulting from the Spill are fully quantified, additional projects to offset injuries will be identified and implemented as needed to address the injuries.

[1] NOAA is partnering with the State of Alabama to implement the Swift Tract Living Shoreline Project. For a more detailed description of NOAA's additional project screening considerations, see the introduction to Chapter 7.

11.3 Organization of this Chapter

Within the remainder of this chapter, there is a subsection for each proposed Phase III project in Alabama. 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) 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 and analysis about anticipated environmental consequences of each proposed project. Although each of the proposed projects falls within proposed project types in 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 reasonably maximize project benefits, minimize potential adverse consequences, and otherwise address environmental compliance needs.

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11.4 Alabama Swift Tract Living Shorelines (NOAA)

11.4.1 Alabama Swift Tract Living Shoreline: Project Description Project Summary

The proposed Alabama Swift Tract Living Shoreline project is intended to employ living shoreline techniques that utilize natural and/or artificial breakwater material to stabilize shorelines along an area in the eastern portion of Bon Secour Bay, Alabama. As the lead implementing Trustee, NOAA would create breakwaters to dampen wave energy and reduce shoreline erosion while also providing habitat and increasing benthic secondary productivity. The project would provide for construction of up to 1.6 miles of breakwaters in Bon Secour Bay adjacent to the 615 acre Swift Tract parcel, which is part of the Weeks Bay National Estuarine Research Reserve (NERR). Over time, the breakwaters are expected to develop into reefs that support benthic secondary productivity, including, but not limited to, bivalve mollusks, annelid worms, shrimp, and crabs. The estimated cost for this project is $5,000,080.

11.4.2 Background and Project Description

The proposed Swift Tract Living Shoreline Early Restoration project is located in the eastern portion of Bon Secour Bay (part of Mobile Bay) approximately 6 miles northwest of Gulf Shores in Baldwin County, Alabama (see Figure 11-1 and Figure 11-2). This living shoreline project area is adjacent to an area named Swift Tract, which is part of the Weeks Bay National Estuarine Research Reserve (NERR). Overall, the Weeks Bay NERR has a diverse set of habitats including tidal wetlands and swamps, salt marshes, aquatic grass beds, maritime and palustrine upland forests, a pitcher plant bog and benthic estuarine sediments. The Swift Tract is approximately 615 acres and is comprised of mesic and hydric pine savannahs, freshwater marshes, and saltwater marshes. The Swift Tract is associated with Essential Fish Habitat (Gulf of Mexico Fishery Management Council, 2004) and is within the NERR management area, whose wetlands are considered a high priority area (Alabama Coastal Area Management Plan, 1999).

This 1.6-mile shoreline shows evidence of erosion over time and appears to be in a net loss that has been exacerbated over the last half century. Recent hurricanes have inundated the adjacent palustrine forest with salt water, dramatically affecting the habitat and accelerating invasion of exotic floral species.

Natural and/or artificial breakwaters would be constructed to protect the shoreline and salt marsh habitat, and increase benthic secondary productivity. Building upon knowledge gained from prior projects, a living shoreline approach would be employed along 1.6-miles of shoreline. Construction activities would include placement of intertidal breakwaters waterward of the shoreline that may utilize artificial and/or shell-based materials and that would generally follow a +0.5 to +1.0 ft. Mean Lower Low Water target crest elevation. The breakwaters would likely have 10 ft. crest widths, based on desired wave reduction, and would be designed with a height that falls within the mean high and low water lines (intertidal). The specific breakwater elevations and technique designs would be selected to maximize shoreline protection and meet federal and state regulatory requirements. Over time, the breakwaters are expected to develop into reefs that support benthic secondary productivity, including, but not limited to, bivalve mollusks, annelid worms, shrimp, and crabs.

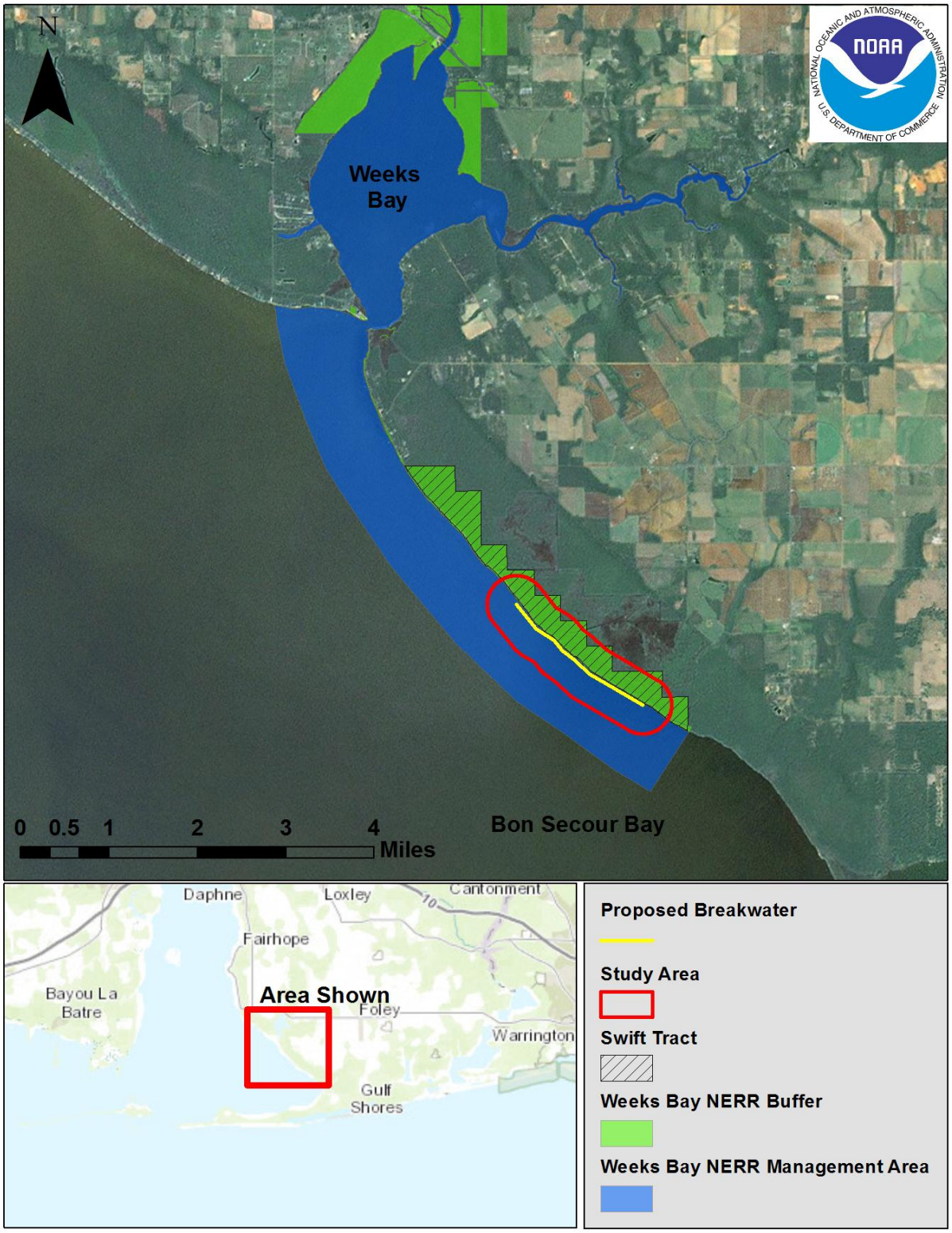

Figure 11-1. General Project Location Map.

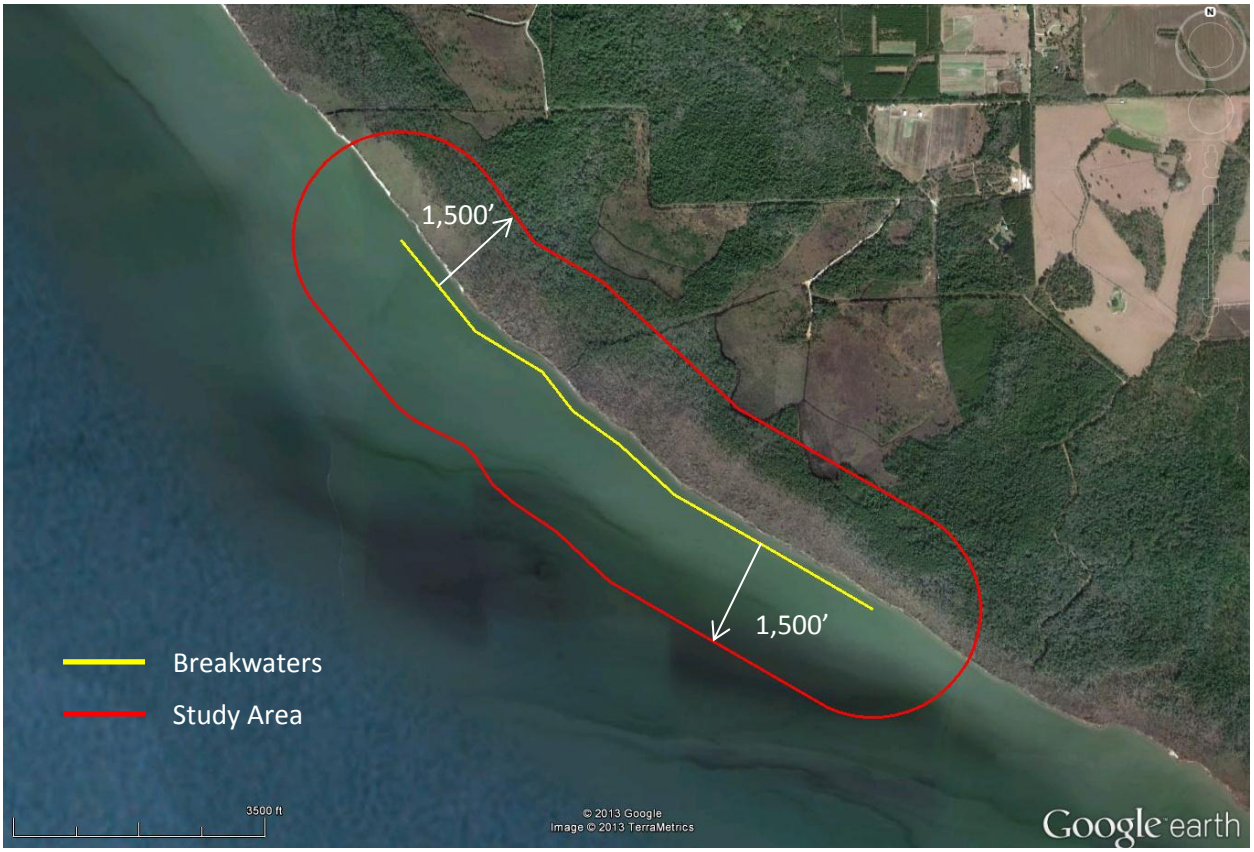

Figure 11-2. Detailed Location Map.

11.4.3 Evaluation Criteria

This project meets the evaluation criteria for the Framework Agreement and OPA regulations. Alabama experienced a loss to salt marsh habitat and benthic secondary productivity, including oyster reefs, as a result of the Spill. The project would restore injured benthic secondary productivity by constructing breakwaters topped with oyster shell veneer, enhance injured salt marsh habitat by reducing future erosion, and compensate for interim losses of salt marsh habitat and benthic secondary productivity for impacts caused by the Spill in Alabama. Thus, the nexus to resources injured by the Spill is clear (*See* 15 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. Several studies of living shoreline techniques have found that these projects can successfully reduce shoreline erosion while providing habitat and water quality benefits (LaPeyre, et al.

2013[2], Scyphers et al. 201[2], Berman et al. 2007[3]). Government agencies, NOAA's non-profit partners, shoreline projects in the Mobile Bay. The Nature Conservancy (TNC) installed a living shoreline project directly south of the proposed Swift Tract living shoreline site after evaluation of suitable sites around the Mobile Bay. The Swift Tract site showed evidence of shoreline erosion and is located adjacent to publicly owned property that is ideal for protection in the public trust. The TNC project was successfully implemented and monitoring results indicate that the project is improving benthic secondary productivity and reducing shoreline erosion. For these reasons, the project has a high likelihood of success. See 15 C.F.R. § 990.54(a)(3) and Section 6e of the Early Restoration Framework Agreement. Cost estimates are based on similar past projects throughout the Mobile Bay, including several large-projects that were implemented with funding from the American Recovery and Reinvestment Act of 2009, and the project can be conducted at a reasonable cost. See 15 C.F.R. § 990.54(a)(1). The Swift Tract project is consistent with regional restoration and conservation efforts including the Weeks Bay NERR Management Plan, The Nature Conservancy's 100-1,000 plan for restoring coastal Alabama, and the Mobile Bay National Estuary Program's 2013 Workplan. As a result, the project is considered feasible, cost effective, and private citizens have successfully implemented similar living and consistent with long-term restoration needs (*See* 15 C.F.R. § 990.54(a)(1),(3),(4) and Sections 6d-6e of the Early Restoration Framework Agreement).

The Swift Tract Living Shoreline project was submitted as a restoration project on the NOAA website (http://www.gulfspillrestoration.noaa.gov).

11.4.4 Performance Criteria, Monitoring and Maintenance

Monitoring activities at the Swift Tract site are planned over a 7 year period (Baseline, Implementation, and Post Implementation) and are estimated to cost approximately $650,000. Monitoring and adaptive management efforts will follow the Living Shoreline Monitoring framework, which is under development by the Trustees. This monitoring approach will incorporate a mix of quantitative and qualitative monitoring efforts to ensure project designs are correctly implemented during construction and in a subsequent period, defined by contract, where corrective actions could be taken by the implementing Trustee (NOAA) to ensure the project meets the following objectives:

- construction of reefs that meet project design criteria and that are sustained for the expected lifespan of the project to support benthic secondary productivity and reduce shoreline erosion,

[1] La Peyre, M.K., Schwarting, Lindsay, and Miller, Shea, 2013,Preliminary assessment of bioengineered fringing shoreline reefs in Grand Isle and Breton Sound, Louisiana: U.S. Geological Survey Open-File Report 2013–1040, 34 p.

[2] Scyphers SB, Powers SP, Heck KL Jr, Byron D (2011) Oyster Reefs as Natural Breakwaters Mitigate Shoreline Loss and Facilitate Fisheries. PLoS ONE 6(8): e22396. doi:10.1371/journal.pone.0022396

[3] Berman, Marcia, Harry Berquist, Julie Herman, Karinna Nunez, 2007. The Stability of Living Shorelines – An Evaluation: Final Report submitted to NOAA Chesapeake Bay Program Office under grant number NA04NMF4570358.

- support habitat utilization of the reefs by bivalves and other invertebrate infauna and epifauna to increase secondary benthic productivity at the project site, and
- reduction of shoreline erosion to protect existing salt marsh habitat.

Baseline monitoring would be conducted to collect data that would be used as a point of comparison for implementation and post implementation monitoring data. Implementation monitoring would be conducted to ensure that the breakwaters were constructed with the appropriate dimensions. The post construction monitoring would be conducted to evaluate the project's performance over time with respect to the overall project objectives. In general, components of this monitoring would evaluate the production and support of organisms on the reef (e.g., benthic secondary productivity) and the performance of the reef protecting the shoreline (e.g., the salt marsh habitat). Performance criteria would be established to determine whether the project achieves the desired breakwater / reef construction specifications, benthic secondary productivity, and salt marsh habitat benefit.

Monitoring would be used to evaluate the project objectives, to assess achievement of performance criteria, and to determine the necessity of corrective actions (adaptive management). Components of this monitoring effort are expected to include collecting information on the following parameters:

- Structural integrity observations of the breakwaters
- Height/elevation and area of the breakwaters
- Consolidation rate of breakwaters
- Shoreline profile
- Shoreline position
- Wave energy / height
- Bivalve species composition, density, size, and biomass
- Infauna and epifauna invertebrate species composition, density, and biomass

11.4.5 Offsets

For the purposes of negotiations 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 Alabama Swift Tract Living Shoreline Project. Habitat Offsets (expressed in DSAYs) were estimated for salt marsh habitat 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 and the time period over which the project would continue to provide benefits. The Trustees and BP agreed that if this restoration is selected for implementation, BP would receive Offsets of 18.14 DSAYs of salt marsh habitat, applicable to Salt Marsh Habitat injuries in Alabama, as determined by the Trustees' total assessment of injury for the Spill.

Benthic Secondary Productivity Offsets (expressed in DKg-Ys) 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 75,727 DKg-Ys of benthic secondary productivity, applicable to Benthic Secondary Productivity injuries in Alabama, 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" Benthic Secondary Productivity Offsets within Federal waters on the Continental Shelf, excluding those associated with mesophotic reefs. These Offsets would not apply to injuries in Mississippi, Florida, Louisiana and/or Texas.

These Offset types and amounts are reasonable for this project.

11.4.6 Cost

The total estimated cost to implement this project is $5,000,080. 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.

11.5 Alabama Swift Tract Living Shoreline: Environmental Review

Combining the objectives of reducing shoreline erosion and reestablishing substrate for shellfish colonization, NOAA proposes to construct breakwaters to protect 1.6 miles of shoreline waterward of the Swift Tract property. Construction activities would include placement of linear breakwaters that may utilize artificial and/or shell-based materials to generally follow a -2 ft. NAVD88 target elevation. The breakwaters would have an approximate ten foot crest width with a height that falls within the mean high and low water lines of the site (intertidal reef). The specific breakwater elevations and technique design would be selected to maximize shoreline protection and meet individual state regulatory requirements.

11.5.1 Introduction and Background

In April 2011, the Trustees and BP entered into the Framework Agreement for Early Restoration Addressing Injuries Resulting from the Deepwater Horizon Oil Spill (Framework Agreement). Under the Framework Agreement, BP agreed to make $1 billion available for Early Restoration project implementation. The Trustees' key objective in pursuing Early Restoration is to achieve tangible recovery of natural resources and natural resource services for the public's benefit while the longer-term injury and damage assessment is under way. The Framework Agreement is intended to expedite the start of restoration in the Gulf in advance of the completion of the injury assessment process. Early restoration is not intended to and does not fully address all injuries caused by the Spill. Restoration beyond Early Restoration projects will be required to fully compensate the public for natural resource losses from the Spill. Pursuant to OPA, federal and state agencies act as trustees on behalf of the public to assess natural resource injuries and losses and to determine the actions required to compensate the public for those injuries and losses. OPA further instructs the designated trustees to develop and implement a plan for the restoration, rehabilitation, replacement, or acquisition of the equivalent of the injured natural resources under their trusteeship, including the loss of use and services from those resources from the time of injury until the time restoration to baseline (the resource quality and conditions that would exist if the spill had not occurred) is complete.

Pursuant to the process articulated in the Framework Agreement, the Trustees released, after public review of a draft, a Phase I ERP in April 2012. In December 2012, after public review of a draft, the Trustees released a Phase II ERP. On May 6, 2013, NOAA issued a public notice in the Federal Register on behalf of the Trustees announcing the development of additional future Early Restoration Plan (DERP). This living shoreline project in Mobile Bay was submitted as a restoration project on the NOAA website (http://www.gulfspillrestoration.noaa.gov). NOAA partners such as The Nature Conservancy, Mobile Bay National Estuary Program, Dauphin Island Sea Lab, and Mississippi Alabama Sea Grant Consortium have employed living shoreline techniques throughout Mobile Bay to protect shorelines and to increase marine / estuarine habitats. NOAA is proposing to employ living shoreline techniques in Bon Secour Bay to reduce shoreline erosion and enhance habitat. The breakwaters will create a total of 2.9 acres of reefs to protect the habitat in the Weeks Bay NERR. This project meets the evaluation criteria for the Framework Agreement and OPA.

Instead of hardened shorelines (such as seawalls), living shorelines techniques utilize natural and artificial breakwater material to stabilize eroding shorelines by dampening wave energy while also providing habitat that was once present in these regions. This living shoreline project in Mobile Bay was submitted as a restoration project on the NOAA website (http://www.gulfspillrestoration.noaa.gov). NOAA partners such as The Nature Conservancy, Mobile Bay National Estuary Program, Dauphin Island Sea Lab, and Mississippi Alabama Sea Grant Consortium have employed living shoreline techniques throughout Mobile Bay to protect shorelines and to increase marine / estuarine habitats. NOAA is proposing to employ living shoreline techniques in Bon Secour Bay to reduce shoreline erosion and enhance habitat. The breakwaters will create a total of 2.9 acres of reefs to protect the habitat in the Weeks Bay NERR. This project meets the evaluation criteria for the Framework Agreement and OPA. This project will also address the impacts to habitat and biota caused by the Spill (See C.F.R. § 990.54(a)(2) and Sections 6a-6c of the Early Restoration Framework Agreement) using established techniques. Cost estimates are based on similar past projects. As a result, the project is considered feasible, cost effective, and consistent with long-term restoration needs (See C.F.R. § 990.54(a)(1),(3),(4) and Sections 6d-6e of the Early Restoration Framework Agreement).

The Mobile Bay Watershed is the sixth largest river basin in the United States and the fourth largest in terms of streamflow. It drains water from three-quarters of the State of Alabama, and portions of Georgia, Tennessee and Mississippi into Mobile Bay, Alabama's only port for ocean-going ships. The Bay is also a point of entry for hundreds of smaller recreational and commercial vessels, many of which cruise the 450- mile trip to the Tennessee River through the inter-basin connector known as the Tennessee-Tombigbee waterway or reach other inland Alabama ports via extensive navigation projects on the Alabama and Warrior River systems.

Mobile Bay is an estuary, a transition zone, where the freshwater from the rivers mixes with the tidally-influenced salt water of the Gulf of Mexico. Estuaries are environmentally and economically important because of their exceptional biological diversity and productivity. The outflow of the Mobile River into Mobile Bay has created the second largest intact river delta system in the nation. It includes a vast network of wetlands and waterways, with over 200 rivers, bays, creeks, bayous, lakes, cutoffs, branches, and sloughs. The Bay is approximately 32 miles long and 23 miles across at its widest point with an average depth of 10 feet. It is fed by two major river systems: the Alabama-Coosa- Tallapoosa system and the Warrior-Tombigbee system. These produce an average total flow out of Mobile Bay of 62,000 cubic feet of water per second. There are many sub-watersheds within the larger Mobile Bay watershed, including the Bon Secour River, Weeks Bay, Magnolia River, Fish River, Three Mile Creek, Bay Minette Creek, Dog River, Fowl River, and the Lower Tensaw River.. (MBNEP 2008)

11.5.2 No Action

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

Under No Action, the existing conditions described in Chapter 3 would prevail. Restoration benefits associated with this project would not be achieved at this time.

11.5.3 Project Location

This project is located in Bon Secour Bay, Baldwin County, AL; it is part of the NERR and adjacent to the 615 acre Swift Tract parcel in the Eastern Shore of Mobile Bay. The NERR has a diverse set of habitats including tidal wetlands and swamps, salt marshes, aquatic grass beds, maritime and palustrine upland forests, a pitcher plant bog and benthic estuarine sediments. The project site is depicted on Figure 11-1 and Figure 11-2 (above).

11.5.4 Construction and Installation

Building upon experience of NOAA on similar projects, a living shoreline approach would be employed along identified shoreline as shown in Figure 11-2. Construction activities would include placement of breakwaters that may utilize artificial and/or shell-based materials and would be expected to take approximately 6 to 10 months to construct. The proposed project depths are approximately 2 feet below MLLW at the Swift Tract site. The specific elevations of the breakwaters and design techniques would be selected to maximize shoreline protection and meet individual state regulatory requirements. Over time, the breakwaters are expected to develop into reefs that support benthic secondary productivity, including, but not limited to, bivalve mollusks, annelid worms, shrimp, and crabs.

11.5.4.1 Constructing Breakwaters

The breakwaters are anticipated to be 8,500 feet long with a crest width of 10’ and total height of 3.0’. Average water depth is assumed to be 2.0 feet below MLLW with a final crest elevation of +0.63’ above MLLW. Calculated volume of material is approximately 15,800 tons of riprap and 2,200 cubic yards of oyster shell. It is anticipated that a crane mounted on a barge would be used to distribute material to the design cross-section. An aerial footprint of approximately 2.9 acres of fine-grained sediment or soft bottom would be covered with a riprap to create the breakwaters. After the breakwater materials are in place, the rip rap would be topped with cultch material to encourage oyster colonization. The cultch material is expected to be land-sourced (as opposed to dredged) bagged oyster shell that would be placed on the surface of the rip rap. Additionally, 6 warning signs placed on 12-inch diameter posts would be installed adjacent to the breakwaters with appropriate signage for marine traffic. No materials are anticipated for removal from the site.

Construction of all elements is anticipated to take between 6-10 months. A full schedule would be dependent on the date funding becomes available, contractor award times, and any species specific restrictions required from ESA, EFH, and/or MBTA reviews. The logistics of the construction process are dependent upon the construction contractor. At this time, it is anticipated that the construction contractor would use existing land based docks and loading areas to stage rip rap, cultch materials, and construction equipment. There are several commercial sources of rip rap and shell, and no one source has been specified. Nearby small boat launches would be used for personnel access to the site. All the construction activities would be performed from water based resources with no activities on the shoreline adjacent to the site.

11.5.4.2 Anticipated Breakwater Construction Process

The alignment and limits of the breakwaters would be surveyed in place with the outer limits of the breakwaters being marked with poles driven into the bottom and extended approximately 3 feet above the water surface. Elevation controls along the alignment would be established. Prior to working in an area, existing bottom elevations along the alignment would be surveyed. Heights of the breakwaters along the alignment would be constructed based on bottom elevations and the proposed crest elevation. Barriers, navigation warning signs (lighted and unlighted), etc. would be established along the work area to protect boaters. These barriers would be maintained throughout the project until permanent markers are established.

This project area has shallow water (approximate 2.0' to 3.0' depth, on average) and fine grained sediment (soft bottom). It is anticipated that one or more work barges with a long-reach backhoe would be positioned along the seaward side of the breakwaters. The work barge(s) would be selected to safely meet the draft requirements in this area. A material barge would be positioned seaward of the work barge in sufficient depth of water, but within reach of the backhoe. The material barge would be loaded so as not to exceed the draft requirements in the work area. Barges would be operated and maintained in sufficient draft to the extent practicable. Placement of the rip rap would be monitored to insure the breakwaters dimensions, slopes, and crest elevation is achieved.

Dredging may be required to allow access to the site for construction of the breakwaters. The dredged excavation and width would be minimized based upon the barge size and draft. The excavation depth should be limited to allow for 8 feet of draft.

Final construction of the breakwaters would be surveyed (alignment, elevation, representative cross-sections, settlement plates, etc.). Permanent navigation signage would be installed in accordance with safety requirements.

11.5.4.3 Best Management Practices

Some temporary shading from workboats during construction periods may occur. It is anticipated that no more than 4 barges would be located on the project site at any time during construction. Assuming barge dimensions of 35'x195', the total shadow effect of the boat/barges is 27,300 sq. ft.

Anchoring sites would be situated to avoid impacts to SAV, if it is found to be in the project area. Access over existing SAV would be avoided to the maximum extent practicable to minimize prop-scarring impacts.

Turbidity levels would be monitored during construction. BMPs would be implemented to maintain ambient water quality standards at or below local and state regulatory / permit levels.

In addition to specific measures noted above, the project would adhere to recommendations for Sea Turtle and Smalltooth Sawfish Construction Conditions (NMFS, 2006). These conditions include notifying construction personnel of the potential presence of sea turtles, monitoring turbidity curtains for possible entanglement of sea turtles, and ceasing construction activities if a sea turtle is within 50 feet of construction areas. The project would also adhere to standard manatee conditions for in water work (FWS, 2011) and any applicable federal and state permit conditions.

11.5.5 Operations and Maintenance

11.5.5.1 Anticipated Pre and Post Project Monitoring Activities

Monitoring would be conducted for a period of approximately 7 years following construction. Monitoring events are expected at least twice annually and access would be from the water. Existing local boat ramps (e.g. Weeks Bay) would be used to access the site. The monitoring activities include:

- topographic/bathymetric surveys,
- vegetation surveys (i.e. species composition and % cover), and
- biological monitoring (i.e. oyster and invertebrate density and biomass)

This project would incorporate a mix of monitoring efforts and performance standards based on the NMFS monitoring framework to ensure project designs are correctly implemented during construction and in a subsequent period, defined by contract, where corrective actions could be taken by the implementing Trustee (NOAA).

Post construction performance monitoring would also be conducted to evaluate the project's performance over time. In general, components of this monitoring would evaluate the production and support of organisms on the reefs (e.g., benthic secondary productivity) and the performance of the protected vegetated habitats on the shoreline (e.g., salt marsh habitat).

Components of this monitoring would include collecting information with respect to: the reef height and structural integrity; marsh height and shoreline position; water quality parameters (e.g., salinity, dissolved oxygen), bivalve and algal presence, coverage, and composition on the reef.

11.5.5.2 Anticipated Maintenance / Adaptive Management Activities

If the reefs are not performing as designed or anticipated, then adaptive management procedures would be used by the implement Trustee (NOAA) to correct the structure. Adaptive management activities may include adding additional shell veneer to the surface of the reefs, adding additional hardened structure (e.g. rip rap), and/or replacing warning signs. All monitoring and adaptive management procedures would follow the minimization measures as described below, especially as they relate to vessel use around the project area.

11.5.5.3 Anticipated short term maintenance activities

One maintenance activity is planned by NOAA within the first four years following construction. The maintenance activity would allow for the capping of the reefs with rip rap and/or cultch material. The reefs are anticipated to experience the greatest consolidation of the subgrade in the first years following construction. Additional placement of rock and shell on the reefs would be assessed based upon the monitoring results. Maintenance activity construction methods are similar to the original construction methodologies described in Section 1.3, above.

11.5.5.4 Anticipated long term maintenance activities

No long term operations or maintenance requirements are anticipated.

11.5.6 Affected Environment and Environmental Consequences

11.5.6.1 Physical Environment

11.5.6.1.1 Geology and Substrates

Affected Resources

Geology

The Mobile Bay is within the East Gulf Coast Plain physiographic province. This physiographic province is bounded by the fall line to the north and by coastal lowlands to the south and is generally characterized by subtle topography and diverse estuarine and tidal areas. The Swift Tract site and study area fall within the Gulf Barrier Islands and Coastal Marshes Level IV Ecoregion.

Subaqueous Soils

The sediment of Mobile Bay ranges from sand to clays with various mixtures of sand, silt, and clay covering most of the bay bottom. The Mobile Bay sediments are approximately 50 percent sand and 50 percent clay as described by the Navy (1986). The northern portion of the bay is comprised of deltaic sands, silty sands, silts, and clayey silts carried in by the Mobile River. Sediments of the lower bay are primarily estuarine silty clay and clay. The western shoreline exhibits sands which grade to clayey sand, sandy clay and clays towards the deeper parts of the bay. Oyster reefs and shell occur in isolated locations in the southern part of Mobile and Bon Secour Bays (COE 1985).

Environmental Consequences

The geological and substrate resources in the project area would be affected through the modification of soft bottom bay habitat into breakwaters (hardened substrate). The project would have a footprint of approximately 2.9 acres in which fine-grained sediment and soft bottoms would be covered with riprap/fossilized oyster shell. Due to water depths in the vicinity of the project site, access channels may need to be dredged. If these access channels are necessary, they would be approximately 30 feet wide and 6 feet deep (average water depths are approximately 2 feet so dredging up to 6 feet would allow for an 8 foot barge draft). The dredged sediments would be side cast and would be backfilled after construction is complete. Additionally, up to 6 warning signs placed on 12-inch diameter posts would be installed adjacent to the breakwaters with appropriate signage for marine traffic, which would impact a small area of soft bottom. Construction of all elements is anticipated to take between 6-10 months. A full schedule would be dependent on the date funding becomes available, contractor award times, and any species specific restrictions required from ESA, EFH, and/or MBTA reviews. Species-specific issues and BMPs are being addressed with NOAA and DOI as part of separate ESA and EFH reviews.

11.5.6.2 Geology and Substrates Findings

There would be short term, moderate, adverse impacts to geology and substrates due to placement of hard, structural material over soft bottom and due to possible dredging to access the site. The installation of the pilings would have a short term, minor adverse impact to sediments. A long term moderate benefit to the bottom substrates would be expected due to stabilization of sediments by hardened reef structures.

11.5.6.2.1 Hydrology and Water Quality

Affected Resources

Currents

Circulation patterns within Mobile Bay are controlled by astronomical tides, winds, and freshwater inflows. The tidal prism of the Bay, based on the weighted mean tidal range of 1.4 feet and a surface area of 236,000 acres, is about 330,000 acre-feet. In the past, during periods of relatively low freshwater inflow, i.e., when inflow is about 12,200 cubic feet per second, the "flushing time" of the Bay is estimated at between 45 and 54 days (Navy 1986).

The tidal circulation of Mobile Bay was investigated by Austin (1954) during a period of low river discharge. This study indicated that the incoming current from the Gulf enters through the main pass. A portion of this water flows up the west side of the bay and part enters the Mississippi Sound through Pas aux Herons. Within about four hours, the flow through Pas aux Herons reverses and water enters Mobile Bay from the Mississippi Sound. Another part of the flooding water mass flows to the east into Bon Secour Bay before turning west to rejoin the generally northward trending flood tide entering the central part of the bay.

Salinity

Salinity distribution of Mobile Bay is dependent upon river flows and tides. Both surface and bottom salinity appear to be lowest in March and April and highest during the four-month period from September through December. Salinity is always higher in the bottom water, although the Bay's average depth is only 9.7 feet (Navy 1986). The relationships between river discharge and salinity profile along the ship channel were reported by McPhearson (1970) (Navy 1986). High river discharges can reduce surface salinities from 20 ppt to nearly 0 ppt even in the southernmost portion of the Bay. High stream flow results in a high hydrostatic head that produces higher tides and currents at the mouth of the Bay. Under extremely high flows, an outward-moving surface current can continue even during flood tide. During low stream flows, saline water can intrude as much as 21 miles upstream in the Mobile River (Navy 1986).

During low river discharges, riverine and transitional waters in the upper and middle Bay form a surface lens over the more saline bottom waters. During periods of moderate to high river discharge, riverine and transitional waters tend to dominate the entire surface field in the lower portion of the Bay (Navy 1986). High-salinity water from the Gulf can move as overflow from the Main Ship Channel, as a broad bottom intrusion, or as a combination of the two. The broad bottom intrusion of marine waters tends to favor the east side of the Bay, whereas riverine and transitional waters favor the bottom of the west side of the Bay (Navy 1986). Observed salinity ranges in the vicinity of Pinto Island are from 0.03 ppt during periods of high rainfall to a high of 13.0 ppt during the typical drier periods of the year (Navy 1986).

Tides

Mobile Bay has a diurnal tidal cycle, typically with one high and one low tide over the average period except during the biweekly neap tides. The mean tidal range in Mobile Bay varies from 1.2 feet at the entrance to 1.5 feet at the head end of the Bay. Within the tidal inlets and bayous along the Alabama coast, the mean tidal range varies from about 0.6 to 1.8 feet. MLW during the winter months and varies from 0.5 to 1.0 foot below the summer month range. The reported range of most tides within the Bay is between 1.0 and 2.5 feet (Navy, 1986).

Winds can induce large variation in the range of the tidal flows. Strong northerly winds can force water out of the Bay, resulting in current velocities of several knots at the main pass. Water levels as much as 1.9 feet below MLW have been recorded under such conditions. The steadier and more prevailing southeast-to-southwest winds induce an opposite condition whereby winds pile water up in the upper portion of the Bay. An indication of the frequency of abnormal wind-driven waves and water setup resulting from these southerly winds has been derived from the frequency with which the eastbound lane of Battleship Parkway had been closed. The eastbound lane, at an elevation of 2.5 feet MLW, is more susceptible to flooding than the westbound lane.

Water Quality

Water quality in the area is generally good. Turbidity in the project area, as well as most of the Bay, is a common occurrence due to shallow depths, silts, windy conditions, and storm events. Low dissolved oxygen levels in the project area have been documented during the period of June through September. There are no known point sources within Bon Secour Bay and non-point sources are limited to septic systems and sanitary sewer overflow. The impaired portion of Bon Secour Bay is limited to the nearshore habitat north of Weeks Bay (ADEM 2010).

Floodplains

The project is located in FEMA designated Flood Zones according to the Flood Insurance Rate Maps (Firms) for Baldwin County. FIRM No. 01003C0908L Baldwin County, (Effective Date July17, 2007). The project is located in Zone VE with base flood elevation 15ft. VE indicates coastal flood zones with velocity hazards (wave action) with base flood elevations determined.

Wetlands

The project is located in open water and no wetlands are known to be within the project area.

Environmental Consequences

Hydrology

Tides, currents, and salinity would be unaffected because the proposed project will have a minimal footprint located adjacent to the shoreline. Hydrology in the direct vicinity of the Swift Tract site would be temporarily affected by the possible dredging of access channels. The access channels would disrupt the normal flow of water in the direct vicinity of the site until they are stabilized and backfilled following construction. Due to the limited possible footprint of the access channels, it is not expected that there will be a change to overall Mobile Bay or Bon Secour Bay hydrological flows and movements. There would be no anticipated impacts from placement of the breakwater structures since each structure will

have at least twenty-five foot gaps that will allow normal tidal fluctuation around the breakwaters. Further, the breakwaters will be porous and water will be able to interchange through the structure.

Water Quality

Short term impacts to water quality would result from increased turbidity during material placement and dredging access channels, if necessary. During construction, BMPs, such as floating turbidity barriers, may be used to contain turbid water and reduce impacts to ambient water quality conditions. In the long term, the reefs are expected to contribute to water quality improvement due to the filtration capacity of oysters that would be anticipated to colonize the reefs.

Floodplains

The project is located below the MHWL and would not impact the floodplain in the project area.

Wetlands

The project would have no adverse effect on wetlands. The project will be constructed in open water and will not result in wetland impacts. After construction, the breakwaters will lead to protection of wetlands on the adjacent Swift Tract site. The breakwaters would be anticipated to reduce wave energy reaching the shoreline and will help protect the fringe of salt marsh habitat and the adjacent palustrine wetlands. If erosion rates continue, the salt marsh and adjacent berm would continue to erode, which would lead to consistent salt water intrusion of the adjacent palustrine wetlands.

11.5.6.2.2 Hydrology and Water Quality Findings

There would be moderate short term adverse impacts expected to hydrology due to possible channel dredging to access the construction area; however, the dredged material would be side-cast and the channels are expected to fill in and stabilize soon after construction is complete so no long-term adverse or beneficial impacts would be anticipated. Minor short term adverse impacts would be expected to water quality due to increased turbidity levels during construction; however, these impacts would be temporally limited to the construction timeframe and turbidity would return to ambient levels within 24 hours after construction completion. The project is expected to result in moderate beneficial long term impact in water quality in the area between the reef structure and the shoreline due to the filtration of oysters and bivalves that colonize the reef. It is expected that due to decreased wave energy shoreward of the reef, that the water clarity would be improved. The project would result in a minor long term benefit to wetlands directly landward of the structure due to accretion and shoreline stabilization (no short term impacts to wetlands are expected). The project would have no effect on floodplains.

11.5.6.2.3 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.). Individual states may promulgate their own ambient air quality standards for these "criteria" pollutants, provided that they are at least as stringent as the federal standards. In Table 11-1, below, both State of Alabama and federal primary ambient air quality standards for criteria air pollutants are presented. The Mobile area is currently in attainment with National Ambient Air Quality Standards (NAAQS) required by the U.S. Environmental Protection Agency (USEPA) (40 C.F.R. Part 50) (USEPA 2012).

Table 11-1. State and federal ambient standards for criteria air pollutants.

POLLUTANT	AVERAGING PERIOD	FEDERAL PRIMARY STANDARD	ALABAMA STATE STANDARD
Ozone	8-hour	0.075 ppm	Same as Federal
PM2.5	Annual (arithmetic mean)	15.0 µg/m3	Same as Federal
	24-hour	35 µg/m3	Same as Federal
PM10	24-hour	150 µg/m3	Same as Federal
Carbon Monoxide	8-hour	9 ppm	Same as Federal
	1-hour	35 ppm	Same as Federal
Nitrogen Dioxide	Annual (arithmetic mean)	0.053 ppm	Same as Federal
	1-hour	0.100 ppm	Same as Federal
Sulfur Dioxide	1-hour	75 ppb	Same as Federal
ppm = parts per million ppb = parts per billion Source: EPA, 2011.			

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 CO2, methane, nitrous oxide, and fluorinated gases, such as hydrofluorocarbons, perfluorocarbons, and sulfur hexafluoride, with CO2 as the major GHG emitted.

Criteria air pollutants and greenhouse gas (GHG) emissions are largely generated by electricity production, vehicular movements, and commercial and residential buildings using electricity, among other sources. GHG emissions would result from both the implementation and operation of the proposed project from the use of vessels during construction activities, maintenance activities, and monitoring activities.

Environmental Consequences

Air Quality
Project implementation would require the use of heavy equipment, which could temporarily lead to air quality impacts from equipment exhaust. 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 cars, trucks, cranes, crew boats, backhoes, small craft vessels, tugboats, and other equipment would contribute to an increase in GHG emissions. 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 and/or boating 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 for generators at construction sites, such as propane or solar, or use electrical power where practicable.

Air quality impacts during construction are expected to be localized, minor, and short-term. Mitigation measures would further offset project impacts from GHG emission and the project would have short-term, minor impacts during construction.

11.5.6.2.4 Air Quality and Greenhouse Gas Emissions Findings
Air quality impacts during construction are expected to be localized, minor, and short-term (no long term effect to air quality). Mitigation measures would further offset project GHG emissions and the project would have short-term, minor releases during construction. No long-term emissions of GHGs are anticipated.

11.5.6.2.5 Noise

Affected Resources
Ambient noise levels in the project area are low to moderate. The major noise producing source of the area year round is breaking surf adjacent to the project area and transient, recreational boating.

Environmental Consequences
Noise from the construction equipment would be evident in the project area. While this noise would be evident to those workers on the job and any users of the shoreline in proximity of the project, it would be short-term and insignificant. Return to normal noise levels would be achieved at the end of each workday and after completion of the job. The project is not anticipated to increase vessel traffic or noise impacts in the long term. Due to the soft substrate in the project area, the pilings will be pushed into place instead of driven. Pushing pilings will minimize noise created from piling installation. The piles will be timber piles less than 12-inches in diameter.

11.5.6.2.6 Noise Findings

The proposed action would result in minor short term, adverse impacts due to use of construction equipment and increased boat traffic. No adverse or beneficial long-term impacts to noise would be expected. The proposed action would not result in any adverse or beneficial indirect impacts.

11.5.6.3 Biological Environment

Even though Alabama is ranked 25th in land area, compared to other states, The Nature Conservancy report, *States of the Union: Ranking America's Biodiversity* (2002), lists Alabama as fifth in terms of biodiversity with a total of 4,533 different species. This distinction is mainly a result of the relatively high number of species of freshwater fish (297), marine animals (250), reptiles (85), amphibians (68), and vascular plants (2,902). This incredible species richness includes 144 *endemic* species, or organisms found only in the state of Alabama. The coastal ecosystems of the Mobile-Tensaw River Delta, Mobile Bay, and Mississippi Sound are unique to the state of Alabama and provide valuable habitat to a large percentage of our diverse floral and faunal populations. (MBNEP, 2008)

The Mobile Bay system supports an array of biological communities and species characteristic of a northern Gulf of Mexico estuary. Estuarine habitats include tidal flats, benthic microalgae communities, seagrass beds, oyster beds, tidal marshes, and planktonic and pelagic communities. Impacts to the Mobile Bay system have resulted from the conversion of forests, agricultural lands, and woody wetlands to urban land. The increase of urban land cover increased by over 50% from 1974 to 2008 (MBNEP & NASA, 2008). Additional studies indicate that urbanization is occurring not only along the coastline, but is expanding in areas with access to estuarine waters and tributaries, particularly Dog River, Fowl River, Big Creek Lake, Chickasaw Creek, Fish River, Wolf Bay, D'Olive Creek, and Fly Creek (MBNEP & USGS).

11.5.6.3.1 Living Coastal and Marine Resources

Affected Resources

(1) Benthos, Motile Invertebrates, and Fishes

The benthic community in the project area was classified by Vittor and Associates, Inc. (1982) in a study of Mississippi Sound and selected sites in the Gulf of Mexico. In the Sound, 437 taxa were collected at densities ranging from 1,097 to 35,537 individuals per square meter. Generally, densities increase from fall through the spring months since most of the dominant species exhibit a late winter to early spring peak in production. Species diversity, evenness, and species richness (number of taxa) demonstrate only minor inconsistent temporal fluctuations. Biomass per unit area also increases from fall to spring, primarily as a result of higher densities. Vittor and Associates, Inc. (1982) named several opportunistic species that are ubiquitous in Mississippi Sound and the nearshore Gulf of Mexico. These species, though sometimes low to moderate in abundance, occur in a wide range of environmental conditions. They are usually the most successful at early colonization and thus tend to strongly dominate the sediment after disturbances such as dredging activities. These species include *Mediomastus spp*., *Paraprionospio pinnata, Myriochele oculata, Owenia fusiformis, Lumbrineris app.,Sigambra tentaculata*, the *Linopherus-Paraphinome* complex, and *Magelona cf. phyllisae*. The phoronid, *Phoronis ap.* and the cumacean, *Oxyurostylis smithi*, also fit this category. *Myriochele oculata* and *O. fusiformis* are predominate species in Mississippi Sound.

The project site lies within the area categorized as the shallow coastal margin mud habitat. The numerically dominant species *Mediomastus californiensis* and *Paraprionospio pinnata* dominated the samples collected by Vittor and Associates, Inc. (1982). Numerous fish species occur within the project area with the most common including: Atlantic croaker (*Micropogonias undulatus*), spot (*Leiostomus xanthurus*), bay anchovy (*Anchoa mitchilli*), and Gulf menhaden (*Brevoortia patronus*) (Swingle, 1971 & Riedel et. al., 2010). No oyster reefs exist within the project area, although several are nearby, including Fish River, Bayou Cour, Bon Secour, and Shell Bank (Figure 11-3).

Two recent analyses of more than twenty years of sampling from the Fisheries Assessment and Monitoring Program of the ADCNR-MRD were undertaken to determine status and trends in stocks that included commercially and recreationally important fish and shellfish in Alabama coastal waters (MBNEP 2008). Monitoring abundance of estuarine-dependent species provides data that can be used to assess fisheries status, determine consequences of habitat degradation, evaluate effectiveness of habitat restoration programs, and ascertain impacts of invasive species. Changes in species abundance must be interpreted using long-term data because of intrinsic time lags of cause-effect processes and high year-to-year "expected" variations due to annual changes in the environmental conditions that characterize coastal waters.

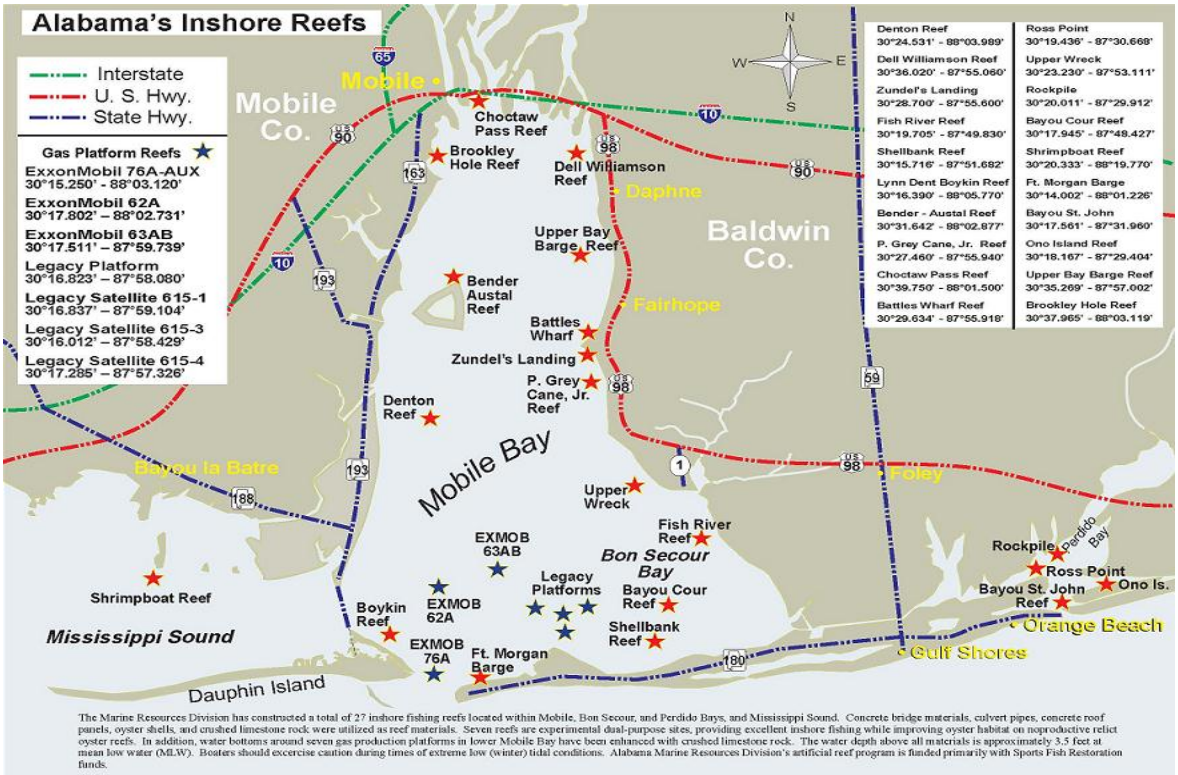

Figure 11-3. Location of existing inshore reefs in the Mobile Bay (source: ADCNR MRD)

In 2006, data on selected species (from 1981-2003), including brown shrimp (*Penaeus aztecus)*, white shrimp (*Penaeus setiferus*), pink shrimp (*Penaeus duararum*), blue crab (*Callinectes sapidus*), lesser blue crab (*Callinectes similis*), hardhead catfish(*Arius felis*), Gulf butterfish (*Peprilus berti*), white trout (*Cynoscion arenarias*), Gulf menhaden (*Brevooria patrouis*), spot (*Leiostomus xanthurus)*, and Atlantic

croaker(*Micropogonias undulatus*), were evaluated along with field samples from shrimp trawls, plankton nets, and seines. This evaluation was used to summarize species' status, to identify species requiring additional management, and to make recommendations to increase their abundance (Valentine et. al. 2006). In 2008, another statistical analysis of FAMP data sets from 1981 through 2007 was completed (Riedel, et. al. 2010). Both studies were in agreement that, for most species, no significant changes in status were revealed over this time frame with notable exceptions for brown shrimp and blue crabs.

Oysters

The eastern oyster (*Crassostrea virginica*) is the primary oyster species found in the Gulf and is the major commercial species. Oysters are important as both organisms and habitat with an integral role in the functioning of the ecosystem. The eastern oyster feeds by filtering large quantities of water through their gills and each adult oyster can filter approximately 1.3 gallons of water per hour, effectively contributing to cleaning the water column (Berrigan et al. 1991; Virginia Coastal Zone Management Program 2011). The volume of water filtered by oysters has been reported to be as high as 10 liters per hour per gram of dry tissue weight (Eastern Oyster Biological Review Team 2007), but the amount varies according to environmental conditions (e.g., salinity, temperature). Oysters remove and digest phytoplankton and particulate organic matter. The undigested particulate matter is deposited on the sediment surface and can be utilized by other organisms.

Oysters require hard substrate upon which to attach. Preferred substrate consists of shell, or a combination of mud, sand, and shell. The substrate must be able to support large oysters without causing them to sink into the substrate (Cake 1983). Oysters prefer to attach to other oysters, but have also been found attached to other hard substrate such as bricks, boats, cans, tires, bottles, crabs, and turtle shells (TPWD 2009). Oysters also attach to armor rock on jetties, pilings, and concrete rubble. Within an oyster reef community, oysters are the dominant species, though over 300 other macrofauna species may be living on an oyster reef (Wells 1961).

In the Gulf of Mexico, oysters are distributed throughout the coastal area and are found in higher abundance in near-shore, shallow, semi-enclosed water bodies, close to freshwater sources (GSMFC 2012). The majority of oysters are found off of Louisiana, followed by Florida, Texas, and Mississippi. Alabama has the lowest density of oysters within the Gulf of Mexico.

Oyster harvests within the Alabama coastal environment**,** in contrast to recent brown shrimp and blue crab landings, were in an increasing trend from the lowest point in 1989 until hurricanes in 2004 and 2005 and the onset of drought conditions in 2006. Without sustained input from upstream freshwater sources, and perhaps exacerbated by the opening of the "Katrina Cut" through the west end of Dauphin Island, salinity in coastal waters has increased and moved upstream, providing ideal conditions for oyster drills, the primary predator of oysters. Reduced catches in 2006 and 2007 reflected this salinity shift. Populations of oysters remain sufficient to produce strong spat sets (i.e., settling juveniles), but the drills consume developing adults before they reach harvestable size. With increased rainfall and modification in restoration practices, this condition could be reversed (MBNEP 2008). Oyster landings in AL have fluctuated widely from 1950 to 2011 (last year for which data are available) and ranged from a

2,191,400 pounds high landed in 1951 to an 11,476 pounds low landed in 1989 ,with a dockside value range of $30,828 in 1951 to $ 3,639,233 in 2006 (Figure 11-4, below).

Oyster reefs are not only important in the Mobile Bay ecosystem for their commercial value as food; they also remove excess nutrients and suspended particles from the water column. Because of the high ecological value of estuarine oyster populations, oyster gardening has been undertaken as a joint effort between the MBNEP, the MASGC, and AUMERC since 2001. In November 2006 and 2007, around 60,000 oysters raised by volunteers and 100,000 raised by AUMERC were placed on Boykin Reef off Dauphin Island and Shellbank Reef in Bon Secour Bay. The oyster gardening program is specifically intended for habitat and ecological restoration, not consumption. More importantly, its educational component teaches citizens that oyster reefs are the estuarine equivalent of coral reefs.

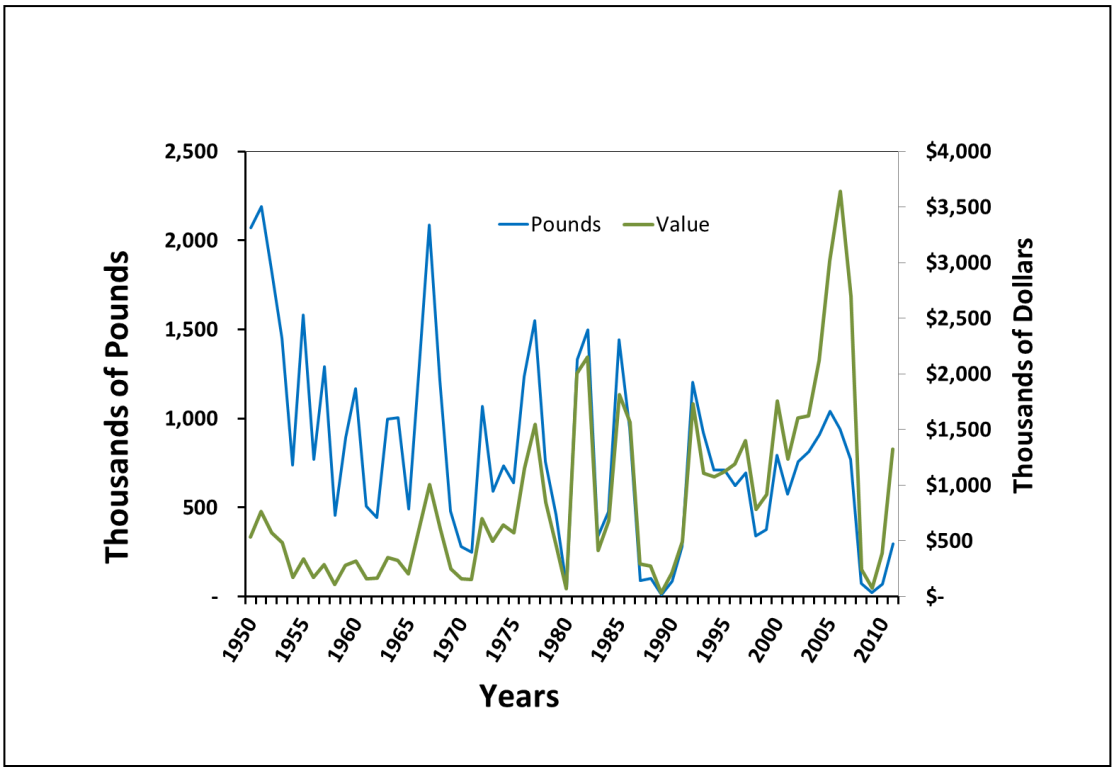

Figure 11-4. Alabama oyster landings (blue line) and value (green line) (NMFS 2011).

Oyster reefs are found throughout Mobile Bay, and some are close to the proposed project area. These include the Fish River Reef, Bayou Cour Reef, Shellbank Reef, and Point Clear Reef. Oysters on these reefs should provide ample larvae for settlement on the shell layer of the proposed reefs (Figure 11-4, above).

Benthos, Motile Invertebrates, and Fishes Environmental Consequences
Potential adverse effects to benthic organisms, oysters, and fish may occur during construction activities; however, these effects would be short term and localized. Disturbance of individual species would occur; however, there would be no change in the diversity or local populations of marine and estuarine species. Any disturbance would not interfere with key behaviors such feeding and spawning. There would be no restriction of movements daily or seasonally.

(2) EFH & Protected Aquatic Species

Essential Fish Habitat (EFH)
EFH is defined in the Magnuson-Stevens Fishery Conservation and Management Act as "those waters and substrates necessary to fish for spawning, breeding, feeding or growth to maturity." The designation and conservation of EFH seeks to minimize adverse effects on habitat caused by fishing and non-fishing activities. The NMFS has identified EFH habitats for the Gulf of Mexico in its Fishery Management Plan Amendments. These habitats include estuarine emergent wetlands, seagrass beds, algal flats, mud, sand, shell, and rock substrates, and the estuarine water column. The EFH within the project area include emergent wetlands, mud substrate, and estuarine water columns for species of fish, such as red drum, brown shrimp, pink shrimp, and white shrimp. There are no marine components of EFH in the vicinity of the project site.

The area also provides habitat for prey species (e.g. Gulf menhaden, shad, croaker and spot) that are consumed by larger commercially important species. In addition, the area provides habitat for spotted sea trout, striped mullet, southern flounder, Atlantic croaker, and Gulf menhaden. Table 11-2 provides a list of the species that NMFS manages under the federally Implemented Fishery Management Plan in the vicinity of the Swift Tract site and Mobile Bay.

Table 11-2. List of species managed by NMFS in vicinity of the project study area (NMFS EFH mapper, 2013).

MANAGEMENT UNIT / SPECIES	LIFESTAGE(S) FOUND AT LOCATION	FMP
Red Drum (*Sciaenops ocellatus*)	ALL	Red Drum
Highly Migratory Species		
Scalloped Hammerhead Shark	Neonate, Juvenile	
Bonnethead Shark	Adult	Highly Migratory Species
Blacktip Shark	Neonate, Juvenile	
Bull Shark	Juvenile, Adult	
Spinner Shark	Juvenile	
Atlantic Sharpnose Shark	Neonate	
Shrimp		
Brown shrimp (*Penaeus aztecus*)		
White shrimp (*Penaeus setiferus*)	ALL	Shrimp
Pink shrimp (*Penaeus duararum*)		
Royal red shrimp (*Pleoticus robustus*)		
Coastal Migratory Pelagics		
King mackerel (*Scomberomorus cavalla)*		
Spanish mackerel (*Scomberomorus maculatus*)		
Cobia (*Rachycentron canadum*)	ALL	Coastal Migratory

MANAGEMENT UNIT / SPECIES	LIFESTAGE(S) FOUND AT LOCATION	FMP
Dolphin (*Coryphaena hippurus*) Little tunny (*Euthynnus alletteratus*) Cero mackerel (*Scomberomorus regalls*) Bluefish (*Pomatomus saltatrix*)		Pelagics
Reef Fish **Balistidae - Triggerfishes** Gray triggerfish (*Balistes capriscus*) **Carangidae - Jacks** Greater amberjack (*Seriola dumerili*) Lesser amberjack (*Seriola fasciata*) Almaco jack (*Seriola rivoliana*) Banded rudderfish (*Seriola zonata*) **Labridae - Wrasses** Hogfish (*Lachnolaimus maximus*) **Lutjanidae - Snappers** Queen snapper (*Etelis oculatus*) Mutton snapper (*Lutjanus analis*) Schoolmaster (*Lutjanus apodus*) Blackfin snapper (*Lutjanus buccanella*) Red snapper (*Lutjanus campechanus*) Cubera snapper (*Lutjanus cyanopterus*) Gray (mangrove) snapper (*Lutjanus griseus*) Dog snapper (*Lutjanus jocu*) Mahogany snapper (*Lutjanus mahogoni)* Lane snapper *(Lutjanus synagris)* Silk snapper (*Lutjanus vivanus*) Yellowtail snapper (*Ocyurus chrysurus*) Wenchman (*Pristipomoides aquilonaris*) Vermilion snapper (*Rhomboplites aurorubens*) **Malacanthidae – Tilefishes** Goldface tilefish (*Caulolatilus chrysops*) Blackline tilefish (*Caulolatilus cyanops*) Anchor tilefish (*Caulolatilus intermedius*) Blueline tilefish (*Caulolatilus microps*) Golden Tilefish (*Lopholatilus chamaeleonticeps*) **Serranidae – Groupers** Dwarf sand perch (*Diplectrum bivittatum*) Sand perch (*Diplectrum formosum*) Rock hind (*Epinephelus adscensionis*) Speckled hind (*Epinephelus drummondhayi*) Yellowedge grouper (*Epinephelus flavolimbatus*) Red hind (*Epinephelus guttatus*) Goliath grouper (*Epinephelus itajara*) Red grouper (*Epinephelus morio*) Misty grouper (*Epinephelus mystacinus*) Warsaw grouper (*Epinephelus nigritus*) Snowy grouper (*Epinephelus niveatus*) Nassau grouper (*Epinephelus striatus*) Marbled grouper (*Epinephelus inermis*) Black grouper (*Mycteroperca bonaci*) Yellowmouth grouper (*Mycteroperca interstitialis*)	ALL	Reef Fish

MANAGEMENT UNIT / SPECIES	LIFESTAGE(S) FOUND AT LOCATION	FMP
Gag (*Mycteroperca microlepis*) Scamp (*Mycteroperca phenax*) Yellowfin grouper (*Mycteroperca venenosa*)		

EFH Environmental Consequences

EFH considerations would be coordinated with the NMFS Habitat Conservation Division through a formal EFH assessment process. If necessary, species specific measures would be recommended by NMFS and would be incorporated into the project construction plan. The project would not result in adverse, direct impacts to emergent wetlands, existing oyster reefs, or Submerged Aquatic Vegetation (SAV). Most motile fauna such as crab, shrimp, and finfish would likely avoid the area of potential effect during the construction process. Following construction, there is expected to be increased habitat utilization of the breakwaters and near-shore environment by these species and a beneficial, long-term impact is anticipated. The project may result in minor, adverse short term impacts to benthic organisms and temporarily affect habitat utilization by individuals considered under EFH fishery management plans.

Minor and temporally limited impacts to EFH components are expected to soft bottom substrates, since the Swift Tract project would be constructed in a near-shore, estuarine portion of the Mobile Bay that is considered EFH for various lifestages of the species managed under FMPs. Because of SAV's overall significance to nearly all managed fisheries, a brief description of effects is provided here. There would be no impacts to SAV expected, based on evaluations conducted for the Mobile Bay National Estuary Program in 2009. SAV in the Mobile Bay were systematically evaluated using aerial photographs in 2002, 2004, and 2009. Results of these surveys indicate that there are no known SAV beds in the vicinity of the Swift Tract Project Site (Vitter and Associates 2009), see Figure 11-5. To minimize impacts to EFH, BMPs and other mitigative measures would be used. BMPs and mitigative measures may include, using floating turbidity barriers, locating staging areas in off-site upland areas, and maintaining loaded draft barge drafts so as not to impact the bottom substrate, driving pilings instead of jetting pilings to reduce turbidity, operating vessels at idle speeds to avoid collision with individuals and to minimize prop scarring, and obtaining shell cultch materials from shucking houses instead of dredged shell sources.

Sea Turtles

There are five species of sea turtles that are found within the Gulf of Mexico: green sea turtle, hawksbill sea turtle, loggerhead sea turtle, Kemp's Ridley sea turtle, and leatherback sea turtle. All five species of sea turtles found in the Gulf of Mexico are listed under the ESA. The Gulf populations of green (breeding populations in Florida), hawksbill, Kemp's Ridley, and leatherback sea turtles are listed as endangered. Loggerhead (northwest Atlantic distinct population segment) and green (except the Florida breeding population) sea turtles are listed as threatened.

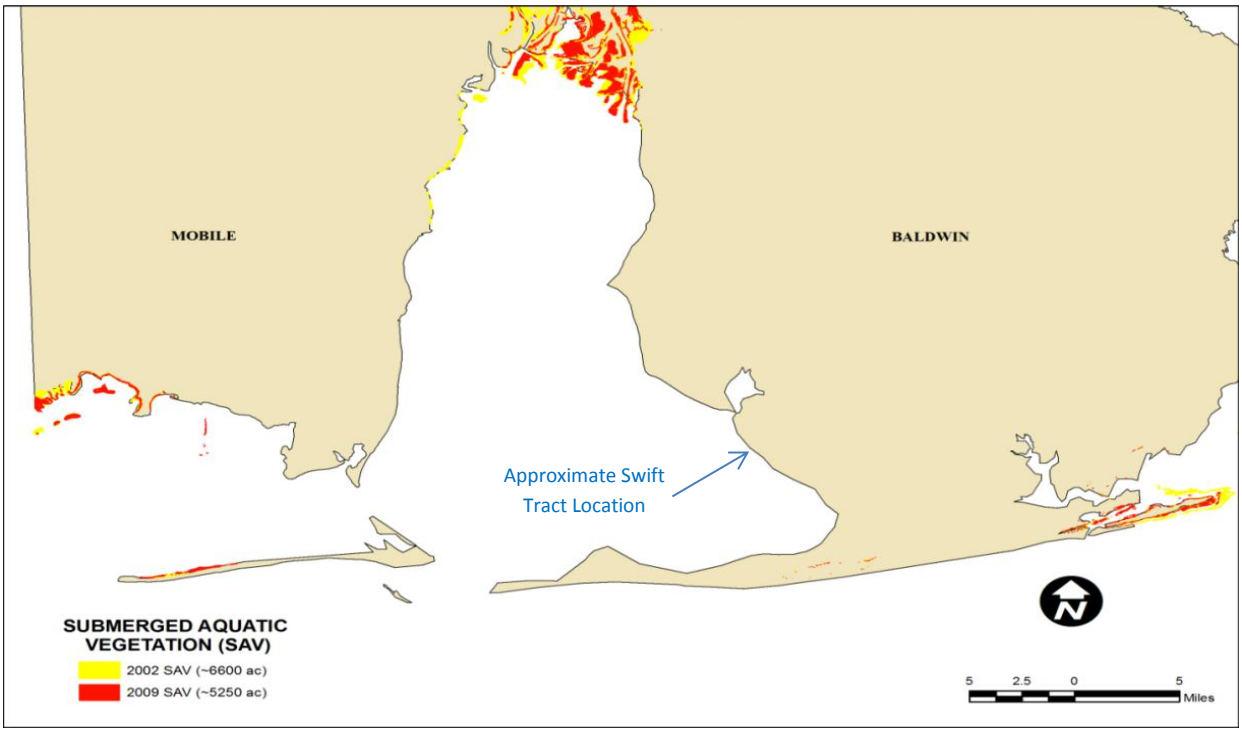

Figure 11-5. SAV distribution comparison from 2002 and 2009 in the Mobile Bay.

Sea turtles in the Gulf (with the exception of the leatherback turtle) have a life history cycle where hatchlings develop in open ocean areas (e.g., continental shelf) and juvenile and adult turtles move landward and inhabit coastal areas. Leatherback turtles spend both the developmental and adult life stages in the open oceanic areas of the Gulf of Mexico (BOEM 2012). Sea turtles nest on low and high energy ocean beaches and on sandy beaches in some estuarine areas. Immediately after hatchlings emerge from the nest, they begin a period of frenzied activity. During this active period, hatchlings move from their nest to the surf, swim, and are swept through the surf zone, and continue swimming away from land for up to several days (NMFS 2013). Once hatchling turtles reach the juvenile stage, they move to nearshore coastal areas to forage. As adults, they utilize many of the same nearshore habitats as during the juvenile developmental stage. Sea turtles utilize resources in coral reefs, shallow water habitat (including areas of seagrasses), and areas with rocky bottoms.

Turtles maintain a variety of Gulf habitats including SAV beds and coral reefs. Grazing on SAV by turtles helps to increase nutrient cycling in those habitats and prevents an over-accumulation of decaying SAV on the seafloor (Thayer et al. 1984). In addition to maintaining habitats, sea turtles also aid in balancing the food web in their marine environments. Leatherbacks, for example, prey primarily upon jellyfish and help to prevent the proliferation of this group that can easily outcompete fish species in the same area (Lynam et al. 2006). Each species of sea turtle in the Gulf is unique and affects the diversity and function of their environment differently; however, all species of sea turtles are critical in maintaining the health, function, and resiliency of the Gulf ecosystem as a whole.

All five species of sea turtles are migratory and thus have a wide geographic range (BOEM, 2012). Although Sea turtles are known to be present within the Mobile Bay and actively nest on adjacent Gulf of Mexico beaches, they are not known to use the area in the vicinity of the Bon Secour Bay and Swift Tract.

Sea Turtle Environmental Consequences

Effects on sea turtles include the risk of injury from construction activities, including physical impacts from construction materials or operating construction machinery. Due to these species' mobility and the implementation of NMFS' Sea Turtle and Smalltooth Sawfish Construction Conditions, the risk of injury from construction would be minimal. Sea turtles may be affected by being temporarily unable to use the project site due to potential avoidance of construction activities and related noise, but these effects would not be significant.

Sea turtles are not likely to forage in the project site given the shallow water depths, sand substrate, and lack of seagrasses and other suitable sea turtle foraging habitat. Impacts due to project installation and short-term turbidity effects would not be significant for sea turtle foraging within the project area. Additionally, any effects would not be significant given the small footprint and short duration of the proposed project activities in relation to similar adjacent habitats available for foraging.

Gulf Sturgeon

The NMFS and FWS listed the Gulf sturgeon (*Acipenser oxyrinchus)* as a threatened species on September 30, 1991. The Gulf sturgeon, also known as the Gulf of Mexico sturgeon, is a subspecies of the Atlantic sturgeon. Adults are 180 to 240 cm (71-95 inches) in length, with adult females larger than adult males. Adult fish are bottom feeders, eating primarily invertebrates, including brachiopods, insect larvae, mollusks, worms and crustaceans. The Gulf sturgeon is an anadromous fish that migrates from salt water into coastal rivers during the warmer months to spawn. The sturgeon often stays in the Gulf of Mexico and its estuaries and bays in cooler months (NMFS 2013a). Most adult feeding takes place in the Gulf of Mexico and its estuaries. The fish return to breed in the river system in which they hatched. Spawning occurs in areas of deeper water with clean (rock and rubble) bottoms. The eggs are sticky and adhere in clumps to snags, outcroppings, or other clean surfaces. Sexual maturity is reached between the ages of 8 and 12 years for females and 7 and 10 years for males. The Gulf sturgeon historically was threatened because of overfishing and then by habitat loss due to construction of water control structures, dredging, groundwater extraction, and flow alterations.

Mobile Bay is not designated as Gulf sturgeon critical habitat; however, FWS includes the Gulf sturgeon on the list of species likely to occur in Baldwin County, Alabama. Sturgeon have been observed, collected, and tagged in the Mobile Bay. Sturgeons were observed using the marine and estuarine waters of the bay, but were not observed moving through the bay toward the Mobile River or spawning. The tagged sturgeon from Mobile Bay returned to the Choctawhatchee River in Florida (Mettee, M.F., et. al 2009; NMFS 2013a).

Gulf Sturgeon Environmental Consequences

Potential adverse effects on Gulf sturgeon would include the risk of injury from construction activities, which would not be significant due to the species' mobility and their low likelihood of occurrence close

to the project site. Some bottom habitat would be converted to hard bottom, as described above. The use of breakwaters as a living shoreline technique may provide an indirect benefit to Gulf sturgeon by enhancing the diversity of prey available by creating patchwork reefs that, over time, provide more dissimilar and structurally complex habitat for prey species. Throughout the duration of the project, the reefs would help mitigate coastal erosion and also encourages nektonic production that could lead to greater prey availability in the immediate surroundings for Gulf sturgeon.

(3) Marine mammals

Affected Resources

Twenty-eight marine mammals are native to the Gulf of Mexico including pelagic species of whales and dolphins and one sirenian, the West Indian manatee. Three species commonly occur at nearby Gulf Islands National Seashore and Mobile Bay and may therefore occur in the waters surrounding the proposed project: the bottlenose dolphin, *Tursiops truncatus,* Atlantic spotted dolphin, *Stenella frontalis*, and the West Indian manatee. Whales are rare transients in the national seashore waters.

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 Florida manatee (*Trichechus manatus latirostris*) is a subspecies of the West Indian Manatee and is listed as endangered under the ESA. The Florida manatee 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, Florida manatees concentrate in areas of warmer water. During summer months, the species may migrate as far west as the Louisiana coast on the Gulf of Mexico and may occasionally be found along the Alabama coast. Manatees inhabit both salt and fresh water of sufficient depth (about 5 feet to usually less than 18 feet).

Florida manatees may be encountered in canals, rivers, estuarine habitats, saltwater bays, and on occasion, have been observed as much as 3.7 miles off the Florida Gulf coast. These manatees will consume any aquatic vegetation available to them including sometimes grazing on the shoreline vegetation. Manatee sightings have been documented in Mobile Bay and/or its tributaries for the past several years, during the period of May through December (DISL 2011).

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. Further, piling installation would be accomplished by pushing

pilings rather than driving pilings to reduce any direct construction related acoustical effects that could potentially harm marine mammal species. 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.

Because of manatee sightings in Mobile Bay and its tributaries in recent years, extreme care should be taken during construction not to disturb or injure manatees. All construction activities should follow the "Standard Manatee Conditions For In-Water Work" (FWS, 2011) to minimize adverse impacts to West Indian manatees. Manatees may be affected by being temporarily unable to use the project site due to potential avoidance of construction activities and related noise, but these effects would not be significant. Any effects would not be significant given the small footprint and short duration of the proposed project activities in relation to similar adjacent habitats available for foraging.

(4) Vegetation

Submerged Aquatic Vegetation

SAV, or seagrass, are rooted vascular plants that grow in fresh, brackish, and saltwater. These beds of SAV provide important foraging grounds and habitats for many species in the Gulf of Mexico. No formal SAV survey has been performed for the project area; however, based upon site inspections performed to date, SAV is very limited or does not exist in the project area. Earlier SAV inventories of Mobile Bay (Stout et al. 1982; COE 1985) identified as much as 20 species of SAV occurring in the shallow shoreline areas of Mobile Bay. Data show that through the 1960s and 1970s, grassbeds in the bay have steadily declined. Historically, a combination of changes has occurred to produce a decline in submerged grassbeds in Mobile Bay. Recent studies of SAV coverage in Mobile Bay have been conducted by MBNEP and ADCNR. Results of these coverage studies indicate that between 2002 (the first mapping date) and 2009, SAV coverage in Mobile Bay has continually declined (Vittor 2009).

The largest factor contributing to SAV decline in Mobile Bay is ambient water quality, specifically nutrients and turbidity. Turbidity can be defined as “muddiness created by stirring up sediment or having foreign particles suspended” in the water column. The brown water commonly seen in Mobile Bay due to its shallow depth and high suspended sediment load (4.85 million metric tons per year) represents turbidity caused by both natural and anthropogenic factors. Turbidity negatively affects SAV by reducing light penetration through the water column). Stormwater runoff contributes to high turbidity levels by delivering sediments into the water column and providing nutrients which stimulate algae growth. Over-enrichment of nutrients (particularly nitrogen) comes from the use of agricultural and household fertilizers on our fields and lawns as well as waste from animals. Other human activities detrimental to SAV survival include recreational and commercial boating which causes a re-suspension of sediments from propellers and boat wakes along bay edges. These activities increase turbidity, and grounding of outboard motor props rips seagrass leaves and rhizomes out of the sediments, leaving behind “prop scars” that can take three to five years to recover. Some other human activities impacting SAV growth include commercial and recreational trawling, which disturbs the substrate in which the plants grow and increases turbidity by stirring up sediments, and deposition of dredge material. (MBNEP 2008).

SAV Environmental Consequences

The occurrence of SAV at the project site is unlikely due to the water quality, other past disturbance to the project area, and based on Mobile Bay SAV observance studies (Vittor and Associates 2009); however, SAV surveys for presence / absence within both the breakwater footprint and the potential access channel areas would be conducted prior to construction. If any SAV are located during the presence / absence survey, their footprint would be recorded using sub-meter GPS equipment. The footprint of any SAV areas would be used to develop a site access plan and construction plan that avoids impacts to SAV. Since SAV are unlikely to occur at the project site and since site specific planning would occur if any SAV are located, potential impacts to SAV would not be significant. The proposed project would likely provide a long-term benefit water quality and would reduce near-shore wave energy within Bon Secour Bay that may make conditions more favorable for the re-establishment of SAV.

Wetlands / Marshes

Wetlands are the transitional zones between land and water. They are considered broadly inclusive of marshes (saltwater, brackish, and freshwater), mudflats, and mangrove habitats. Coastal wetlands comprise millions of acres of habitat for aquatic and terrestrial organisms that are ecologically and economically important to the Gulf region. For example, approximately 97 percent of all fish and shellfish harvested from the Gulf of Mexico rely on coastal estuarine habitat during spawning or during other parts of their life cycle (NOAA 2010). Coastal wetlands are created by natural deltaic cycles and also by floodplain dynamics; e.g. the majority of Louisiana's coastal wetlands were built by deltaic processes of the Mississippi River (COE 1997). Coastal, freshwater wetlands are typically formed by floodplain dynamics.

Mobile Bay wetlands provide shelter and food for a variety of unique and ecologically, commercially, and recreationally important fish and invertebrates including juvenile shrimp, blue crab, and oysters. Freshwater and saltwater wetlands also absorb excess nutrients, sediments, and pollutants from stormwater runoff prior to emptying into Mobile Bay. Wetlands provide the benefit of slowing the overflow of river waters and protecting against property damage and loss of life from floodwaters and tropical weather events. Research has shown that the more area and available "edges" of emergent wetlands there are in an estuary, the more shrimp the estuary will produce. The monetary value of wetlands' ecological functions, relative to what it would cost for humans to engineer facilities to perform the functions, was evaluated by Mitsch and Gosselink (Wetlands 2000) and was estimated to be up to $36,000 per acre.

The transition from a freshwater to a saltwater environment in the Mobile Bay watershed allows for the existence of a variety of wetland ecosystems, including scrub-shrub wetlands, forested wetlands, freshwater wetlands, and non-fresh, or saltwater emergent wetlands. The *National Coastal Condition Report II* published in 2005 by the EPA indicated that wetland loss in Alabama over the last 40 years was four times greater than the national average. According to NOAA's Coastal Services Center, over 50% of Alabama's coastal wetlands were lost between 1780 and 1980, largely due to increases in population density and urban development. Research from Roach et al. (1987) indicates that freshwater wetland decline in Mobile Bay is largely a result of urban development (61%) and conversion to forest through drainage (27%). The majority of saltwater wetlands loss was due to the natural processes of succession

(30%) and erosion or subsidence (17%). Anthropogenic impacts on salt marsh were industrial or navigational development (24%) and commercial or residential development (20%). Wetlands in the vicinity of the project area are depicted in Figure 11-6, below.

The 1.6-mile, Swift Tract shoreline shows evidence of erosion over time and appears to be in a net loss that has been exacerbated over the last half century. Recent hurricanes have inundated the adjacent palustrine forest with salt water, dramatically affecting the habitat and accelerating invasion of exotic floral species.

Wetland / Marshes Environmental Consequences

There would be no adverse impacts to salt marsh habitats. Instead, the proposed project would protect existing salt marsh and would provide a long-term benefit by restoring the historically eroded, Swift Tract shoreline.

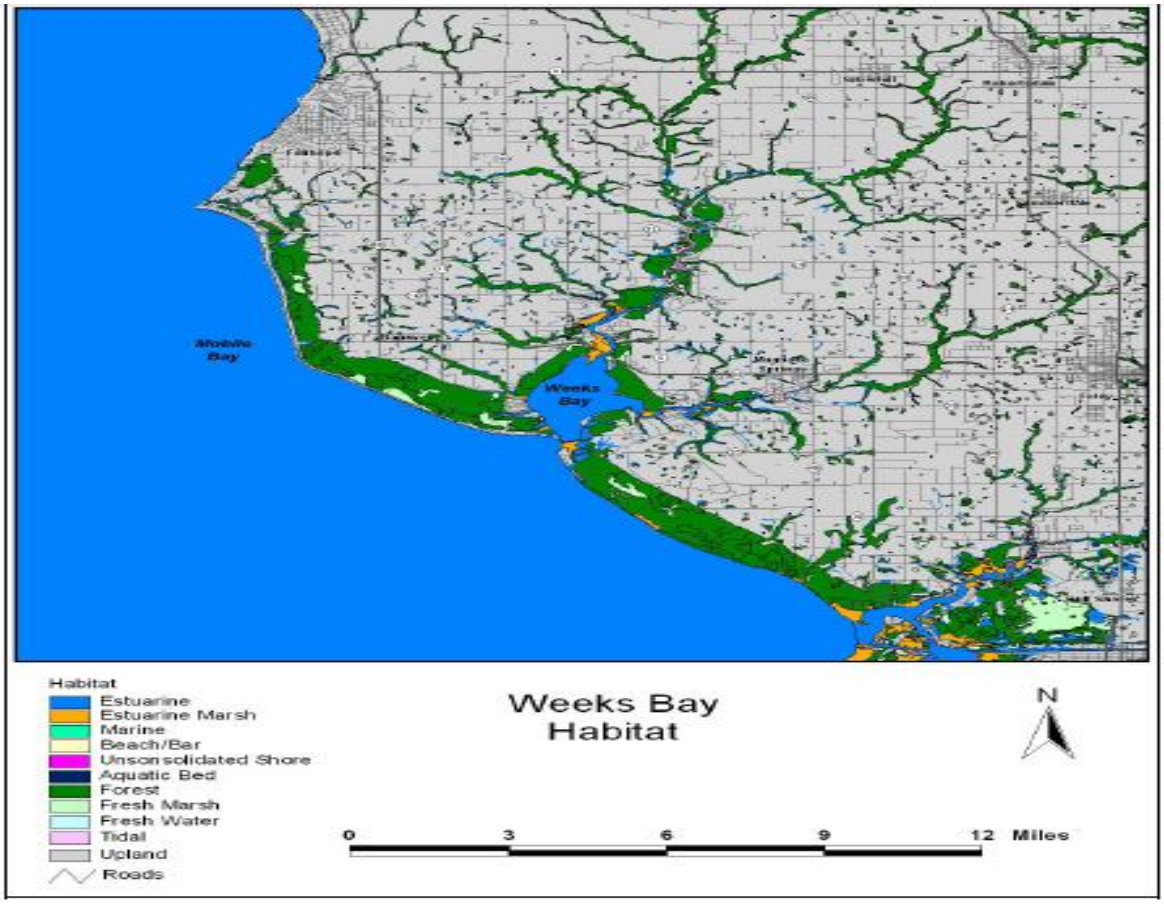

Figure 11-6. Wetland communities located in the Weeks Bay Watershed.

11.5.6.4 Findings Living Coastal and Marine Resources

(1) Benthos, Motile Invertebrates, and Fishes

The Swift Tract project would result in moderate adverse short term impacts due to possible dredging for access and placement of reef material on soft bottom substrate. The project would result in minor adverse short term impacts to some individual fish in the vicinity of the project area due to increased construction noise; however, there is sufficient habitat beyond the effects area that there would be no interference to populations. Long term moderate beneficial impacts are expected due to creation of hard reef structure since the reef structure would increase the abundance of transient fish, crabs, and shellfish species (Gregalis et. al. 2009). A minor beneficial long term effect would be expected due to an increased spat set for reefs in the vicinity of the project site.

(2) EFH and Protected Species

The Swift Tract project would result in a minor, short term, localized adverse impact to red drum individuals during construction, but this species is motile and would likely exit the area during construction (no impacts to overall population would occur). Further, there is sufficient habitat beyond the effects area that there would be no interference to red drum populations and no long term effects are anticipated. Minor impacts to shrimp during construction would be expected due to increased vessel traffic; however, long-term minor beneficial effects are expected to shrimp due to increased juvenile and reproductive habitat created by the reefs. The project would result in moderate, long-term beneficial impacts to other EFH components due to increased habitat created by the reefs. There would be no expected long term indirect impacts.

Direct and indirect impacts to sea turtles and Gulf sturgeon would not be expected due to their limited utilization of the habitats in the vicinity of Swift Tract and based on incorporating the Standard Sea Turtle Construction methodologies into the construction plan. The Trustees intend to implement measures that are required by the USFWS and NMFS and would consider any additional practices that may emerge from additional regulatory consultations and summarize those in the Final ERP/PEIS.

(3) Marine Mammals

The project would have no short term or long term effects to dolphin species. The Swift Tract project construction would result in minor, short term impacts to manatees. Impacts would be localized and the construction procedures would follow the "Standard Manatee Conditions For In-Water Work" (FWS 2011). BMPs would be implemented during and after construction of the breakwaters to avoid or minimize potential impacts to the federally protected species that may be in the area. In addition, contractors and workers would be educated and informed of the BMPs before construction is initiated to ensure safe protection of these federally protected species. There would be no long term direct impacts expected from the proposed action.

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 and summarize those in the Final ERP/PEIS.

(4) Vegetation

The proposed action would not be likely to result in any short term, measurable impact to SAV or wetlands. There would be no expected adverse impacts to SAV because there is no known SAV present in the vicinity of the project and since pre-construction presence/absence surveys will be conducted in the access channel areas and breakwater footprint area, which would allow for creation of plans to avoid SAV that may be present. Moderate positive long-term benefits to the near-shore water column (quality and movement) may create a more suitable environment for SAV establishment. The project would be expected to result in a moderate beneficial, long-term impact to the 1.6 mile eroded, Swift Tract shoreline wetland system.

11.5.6.5 Terrestrial species

Affected Resources

Terrestrial wildlife includes species such as diamondback terrapin, beach mice, alligator, otter, and mink that live in coastal, riparian, and upland areas.

(1) Reptiles

Diamondback Terrapins

Diamondback terrapins are believed to be the only turtle in the world that lives exclusively in brackish water habitats (e.g., tidal marshes, estuaries, and lagoons). The species primarily forages on fish, invertebrates (e.g., snails, worms, clams, crabs), and marsh grass. Nesting for the species occurs within sandy beach and/or shell habitats. Terrapin hatchlings emerge from August to October. Only 1 to 3 percent of the eggs laid produce a hatchling, and the number of hatchlings that survive to adulthood is believed to be similarly low (Defenders of Wildlife 2011). Most terrapins hibernate during the winter by burrowing into the mud of marshes. Decreases in terrapin populations have been documented throughout their range due to interactions with commercial crab/lobster industries, coastal development and incidental injury from motorboats (ADCNR 2010). It is for these reasons that diamondback terrapins have received “species of special concern” status in many states including Alabama and Louisiana.

American alligators

American alligators are an important part of the environment; not only do they control populations of prey species, they also create peat and “alligator holes,” which are invaluable to other species (Britton 1999). Alligators are known to dig holes in mud where water fluctuates to provide protection from heat. These animals are carnivores that feed on anything; they eat fish, snails, birds, frogs, turtles, and mammals near the water’s edge (Schechter and Street 2000). Although they are primarily freshwater animals, alligators will also venture into brackish salt water (Savannah River Ecology Laboratory 2012). Their populations have increased as a result of strict conservation measures, but alligator habitat is still being destroyed. Alligators are good indicators of environmental factors, such as toxin levels – increased levels of mercury have been found in alligator blood samples (Britton 1999). The first few years of an alligator hatchling’s life are the most dangerous, as they are preyed upon by snakes, wading birds, osprey, raccoons, otters, large bass, and garfish (Ross 1989 as cited in Schechter and Street 2000). Once an alligator reaches about 4 feet, man becomes its main predator (Ross 1989 as cited in Schechter and

Street 2000). Alligators are hunted for their skin, which is commercially used for the creation of wallets, purses, boots, and other textiles (Schechter and Street 2000). Alligators are also raised in captivity for the production of their meat and skin, resulting in a multimillion dollar industry (Schechter and Street 2000). In addition, alligators are a tourist attraction, especially in Florida (Schechter and Street 2000).

Reptile Environmental Consequences

Noise and other activity associated with proposed construction may temporarily disturb diamondback terrapin and alligators that are in the project area during construction. Construction activities may also temporarily increase the potential for boat collisions with these species. However, the mobility of these species reduces the risk of injury due to construction activity. Further piling installation would be accomplished by pushing pilings rather than driving pilings to reduce any direct construction related acoustical effects that could potentially harm alligators. Based on the mobility of these species, the short duration of construction activities, and the proposed construction methodology, effects on reptiles are not anticipated.

(2) Mammals

North American River Otter

The river otter is a member of the weasel family. They are found in a variety of freshwater habitats including rivers, streams and marshes. Their home ranges can be as small as 5 miles and as large as 40 since they are able to travel over land to reach water sources. They typically feed on a variety of fish, freshwater mussels, crayfish, frogs, snakes, and turtles. In Alabama, much like the rest of their range throughout North America, river otters live in freshwater systems such as rivers, lakes, swamps, and ponds. (ADCNR, 2011a)

Mammal Environmental Consequences

Noise and other activity associated with proposed construction may temporarily disturb river otters; however, it is unlikely that this species would be present in the construction area. River otters would more likely be found in the freshwater wetlands associated with the Swift Tract parcel. Based on the unlikely presence of beach mice and river otters and the river otter's mobility, effects on mammals are not anticipated.

(3) Threatened and Endangered Terrestrial Species

Beach mice

There are five species of beach mice in the Gulf of Mexico: Choctawhatchee beach mouse, Alabama beach mouse, Perdido Key beach mouse, Santa Rosa beach mouse, and St. Andrew beach mouse. All except the Santa Rosa beach mouse are protected under the ESA.. Beach mice, in general, exhibit typical nocturnal behavior and mice appear to inhabit a single home range during their lifetime. The sizes of home ranges varied among species/subspecies. The primary and secondary dunes (frontal dunes) are considered optimal beach mouse habitat since it is where the mice were thought to reach their highest densities. Furthermore, the scrub dunes appear to serve as refugia for beach mice during and after a tropical cyclone event. (FWS 2013).

Beach mice play an important role in food-web relationships. Beach mice consume plant material (e.g. sea oats, bunch-grass, seeds) and invertebrates and serve as prey for predators, such as carnivorous mammals, snakes, and birds of prey. In addition, beach mice help plant communities by dispersing seeds. Main stressors that negatively impact beach mice include severe storms that destroy habitat and drown mice in their burrows, coastal development and loss of dunes, and predators (e.g., domestic cats and red fox) (FWS 2013).

Because of extensive development throughout the Alabama Gulf Coast, the present-day distribution of the Alabama beach mouse is greatly reduced (ADCNR 2011). The imperiled status of the mouse is due to habitat loss and fragmentation associated with residential and commercial real estate development, which isolates the remaining populations and substantially increases their vulnerability to the effects of tropical storms, weather cycles, predation, and other environmental factors (ADCNR 2011).

Beach mice of Florida and Alabama are listed as endangered on the U.S. Endangered Species List. At the time of its listing as endangered by the FWS in 1986, the only known population of the Perdido Key beach mouse was at Florida Point on Perdido Key. By 1986, the number of mice remaining was believed to be less than 30 animals, earning it the unfortunate designation as the "Most Endangered Small Mammal in North America" (ADCNR 2011). Predation by domestic cats contributed significantly to the demise of this population. Starting in 2000, a new population was reestablished on Perdido Key State Recreation Area (ADCNR 2011). In 2010, a population of Perdido Key beach mice was reestablished at Florida Point by translocation. Currently the Perdido Key beach mouse resides throughout its historical range on Perdido Key including public and private lands throughout the island (FWS 2013).

Alabama Red-Bellied Turtle

The Alabama red-bellied turtle is listed as endangered on the U.S. Endangered Species List. These turtles are typically found in shallow vegetated backwaters of freshwater streams, rivers, bays, and bayous in or adjacent to Mobile Bay. They seem to prefer habitats having soft bottoms and extensive beds of submergent aquatic macrophytes (aquatic plants that grow in or near water).

Threatened and Endangered Species Terrestrial Species Environmental Consequences

There are no anticipated consequences to beach mice since they are not known to utilize the project area. The Swift Tract project area provides suitable habitat for the red bellied turtle; however, there is no SAV present which limits the value of the habitat for this species. Placing structural material over the soft bottom will impact their habitat, but it is anticipated that the placement of the breakwater will create conditions favorable for future SAV colonization. Further, stabilizing the shoreline and possible future accretion of sandy beaches will provide additional nesting habitat for the red bellied turtle. Construction related impacts will be minimized by conducting pre-construction surveys and monitoring for turtle presence during construction.

11.5.6.6 Terrestrial Species Findings

The proposed action would have a short term, minor localized adverse impact to terrestrial individuals during construction, but these species are mobile and would likely exit area during construction (no impacts to overall population). The proposed action would have a long term, minor, beneficial impact to terrestrial species due to improved shoreline foraging habitat for diamondback terrapin and increased

food source for alligators from potential attraction of transient fish and blue crabs to the reef (Gregalis et. al. 2009). The proposed construction would result in short term, minor adverse effects to the Alabama red-bellied turtle (no long term beneficial adverse effects are anticipated). The proposed action would not result in any adverse or beneficial indirect impacts.

11.5.6.7 Birds

Affected Resources

Many species of birds spend all or a portion of their life cycle along the Gulf of Mexico using a variety of habitats at different stages. Major groups of birds that use habitats throughout the northern Gulf of Mexico include: waterfowl and other water-dependent species, pelagic seabirds, raptors, colonial waterbirds, shorebirds, secretive marsh birds, and passerines. Information related to these major groups of birds is presented in Chapter 3 and its appendix.

Many bird species migrate between breeding and wintering habitat and, upon reaching the Gulf Coast, migrate east-west along the northern Gulf Coast and/or cross the Gulf of Mexico each fall and spring. Central, Mississippi, and Atlantic Flyways are used by millions of birds that converge on the Gulf Coast where they either migrate along the northern Gulf Coast before reaching their destination on the Gulf of Mexico; follow the Mexico-Texas coastline (circum-Gulf migrants); or cross the Gulf of Mexico between Mexico's Yucatan Peninsula and the Texas Coast (trans-Gulf migrants) (TPWD 2011a). The largest concentration of northbound migrating birds crosses the Gulf of Mexico reaching the northern Gulf of Mexico shoreline between the northern Texas coast and the Florida Panhandle (Morrison 2006).

Impacts from storm events disrupt and displace nesting colonies along Alabama's coastal barrier islands; however, in the vicinity of the project area, there is a documented high diversity of birds around Mobile Bay. Dauphin Island has nesting pairs of blue herons and nesting least terns. Gaillard Island, a manmade island close to Dog River is used by laughing gulls, brown pelicans, royal terns, sandwich terns, Caspian terns, and herons, egrets. A relatively new mixed colony, including approximately 200 nesting pairs of Glossy Ibis, White Ibis, Little Blue Herons, Snowy Egrets, Yellow Crowned Night Herons, and Great Egrets, formed at the former site of the International Paper Company after Hurricane Ivan and grew after Katrina, probably as a consequence of habitat loss on Cat, Coffee, and Gaillard Islands. (Butcher 2009) The Weeks Bay NERR provides habitat for over 300 bird species, including 100 known residents, 125 wintering species, and 85 spring/fall migrants (NERR 2009). The groups of bird species utilizing habitats within vicinity of the Swift Tract site are described below in Table 11-3.

Migratory Bird Treaty Act

The Migratory Bird Treaty Act (16 U.S.C. §§703 et seq.) makes it "unlawful at any time, by any means or in any manner, to…take, capture, kill, attempt to take, capture, or kill, possess,…ship, …, transport or cause to be transport …any migratory bird, any part, nest, or egg of any such bird." The MBTA applies to migratory bird species that occur in the United States as the result of natural biological or ecological processes. Over 800 species of birds occurring in the United States are protected under the MBTA. No colonies of colonial nesting waterbirds have been observed in the proposed project area, but suitable habitat exists on the Swift Tract parcel.

Table 11-3. Groups of bird species utilizing habitats within the vicinity of the Swift Tract Site.

SPECIES	BEHAVIOR	SPECIES/HABITAT IMPACTS
Waterfowl (geese, swans, ducks, loons, and grebes)	Foraging, feeding, resting, and roosting	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.
Other water birds (terns, gulls, skimmers, double-crested cormorant, American white pelican, brown pelican)	Foraging, feeding, resting, and roosting	These birds 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 outside of the project area.
Raptors (osprey, hawks, eagles, owls)	Foraging, feeding, resting, and 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. The areas in the NERR where these birds roost and nest are not within the project area. The project is expected to improve foraging habitat for raptors.
Colonial Wading birds (herons, egrets, ibises, wood stork, American flamingo)	Foraging, feeding, resting, and 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 nest and roost in trees or shrubs (e.g. pines, *Bacchurus* and mangroves), which occur outside the project area. In addition, this project is likely to improve shoreline habitat conditions and near-shore habitat.
Shorebirds (plovers, oystercatchers, stilts, sandpipers)	Foraging, feeding, resting, and roosting	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. These birds primarily nest or roost outside the immediate area of disturbance.
Marsh birds (passerine species; grebes, bitterns, rails, gallinules, and limpkin)	Foraging, feeding, resting, and roosting	Marsh birds forage, feed, rest, and roost in the vicinity of the project area. As such, they may be impacted locally and temporarily by the project. However, 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.

Bald and Golden Eagle Protection Act

Bald eagle (*Haliateetus leucocephalus*) is no longer protected under the ESA as the species has achieved recovery. . The bald eagle is, however, protected by the U.S. government under the Bald and Golden Eagle Protection Act and the Migratory Bird Treaty Act. Bald eagles occur most commonly in areas close to coastal areas, bays, rivers, lakes, or other bodies of water that provide concentrations of food sources, including fish, waterfowl, and wading birds. Usually the bald eagle nests in tall trees (mostly live

pines) that provide clear views of surrounding area. In the Southeast, bald eagles typically nest between September and May.

Suitable habitat for the bald eagle is present on the Swift Tract property and the estuarine waters between the shoreline and the proposed project site. There are no documented occurrences of bald eagles on the Swift Tract property; however, this species has been documented around Week's Bay approximately three miles north of the project site (ebird.org, 2013). None of the documented occurrences would be visible from the construction area.

Threatened and Endangered Bird Species

Three Federally listed bird species, the piping plover, the red knot, and the wood stork, are known to occur in Baldwin County, Alabama.

The piping plover is a small North American shorebird with three distinct populations that breed in the Great Lakes, the Northern Great Plains and the Atlantic Coast. The Atlantic Coast population breeds from North Carolina to Newfoundland and winters in the Caribbean and along the Atlantic and Gulf Coasts. Piping plovers typically utilize sand beaches, mixed sand and gravel beaches and exposed sandy tidal flats. In Alabama, critical habitat for piping plovers is limited to the Gulf barrier islands and is not in the vicinity of the Swift Tract project area.

The wood stork is the largest wading bird breeding in the United States. Wood storks are residents of the Southeast specifically along the Gulf Coast from Texas to Florida. In Alabama, wood storks are regularly found in summer and early fall in western Inland Coastal Plain near the Tombigbee River, lakes in Hale, Marengo, and Perry Counties, and at ponds near Montgomery. Wood storks generally utilize freshwater wetlands as primary habitat; however, during times of drought, depressions in brackish marshes become important habitat components. The Swift Tract project will not impact any habitat typically used by the wood stork.

The red knot was added to the list of Federal candidate species in 2006. A proposed rule to list the *rufa* supbspecies as threatened under the Endangered Species Act was published on September 30, 2013. Red knots are federally protected under the Migratory Bird Treaty Act, and are State-listed as endangered. The red knot is a large, bulky sandpiper with a short, straight, black bill. In Alabama, the red knot is rare in winter, spring, late summer, and occasional in early summer in Gulf Coast region. They are typically found in mudflats and along sandy shores.

11.5.6.8 Bird Environmental Consequences

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 is ongoing between the Trustees and the U.S. Fish and Wildlife Service.

The living shoreline project would have a minor, direct positive long-term impact on bird species in the area by reducing wave energy / erosional losses in the area and increasing habitat for juvenile finfish and shellfish as a source of food for shorebirds and wading birds. The project would have a minor, short term impact to birds during construction due to elevated noise levels and presence and operation of

equipment. Given the small project footprint and the species' mobility, any species foraging within the project area during construction would be able to avoid direct impacts. Potential effects to prey resources may occur during construction; however, these would be minor and temporary

To determine the potential for impacts to nesting birds, a pre-construction survey of wetland areas within the 500 feet of the project construction footprint will be conducted. If nests are observed prior to construction, NOAA will confer with FWS on specific conservation measures, which may include minimizing boat traffic within 300 feet of the nests and operating vessels at idle/no wake speed. Conducting pre-construction surveys would minimize the potential impact to nesting birds and it is expected that these potential impacts would be minor. Further, it is anticipate that this threshold of potential effects on bird populations has a low probability of occurring.

Pre-construction surveys would include bald eagle nests. If bald eagle nests are located, FWS best management practices (2007) would be followed to minimize harm to bald eagles. For water based construction activities that are intended to protect the shoreline, best practices include:

- Conducting construction activities outside of nesting season, if nests are present;
- If a nest is present and it is not possible to avoid construction, maintain a buffer of at least 660 feet from the nest; and,
- Minimize the number of boat trips passing within 660 feet of the nest location.

11.5.6.9 Bird Findings

The proposed action would result in minor, short-term, localized impacts to transient bird individuals during construction, but these species are mobile and would likely exit the area during construction (no impacts to overall population). If nesting birds are located and conservation measures are established for bird species, the proposed action would not result in adverse impact to nesting birds. The proposed action would have a long-term minor beneficial impact due to increasing habitat for juvenile finfish and shellfish as a source of food for shorebirds and wading birds. The proposed action would not result in indirect impacts to birds. The action would not likely adversely affect piping plover or wood stork.

11.5.6.10 Threatened and Endangered Species

Affected Resources

FWS and NMFS list species as threatened or endangered when they meet criteria detailed under the ESA of 1973, as amended (16 U.S.C. §1531 et seq.). 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 FWS, depending upon the protected species that may be affected.

As discussed above, there are several species listed under the ESA that are likely to occur in the vicinity of the Swift Tract action area. Table 11-4 lists each species likely to occur within the project area, describes their general habitat, and lists their Federal and State status. Sea turtles are unlikely to use the area around the Swift Tract site because of shallow water and lack of foraging habitat. Piping

plovers and beach mice do not have appropriate foraging or nesting habitat in the vicinity of the Swift Tract project site. The Gulf sturgeon may utilize Bon Secour Bay for foraging or resting grounds; however, their occurrences within Mobile Bay are limited and their critical habitat does not extend into Mobile Bay. Manatees have been documented in Mobile Bay in small numbers and it is unlikely that any individuals would be present in vicinity of the Swift Tract. Coordination with the FWS and NMFS-Protected Resource Division will minimize any potential impacts to the species since recommendations will be incorporated into the project.

Table 11-4. List of Federally Threatened & Endangered Species likely to occur within the vicinity of the Swift Tract site.

SPECIES	COMMON NAME	HABITAT	FEDERAL STATUS
Birds			
Mycteria Americana	Wood stork	Freshwater wetlands in the southern coastal plain	Endangered
Charadrius melodus	Piping Plover	Sand beaches, mixed sand and gravel beaches and exposed sandy tidal flats	Threatened
Calidris canutus rufa	Red Knot	Mudflats and along sandy shores	Imminent Listing
Fish			
Acipenser oxyrhynchus desotoi	Gulf sturgeon	Migrates from large coastal rivers to coastal bays and estuaries	Threatened
Scaphirynchus suttkusi	Alabama sturgeon	Fresh, deep, fast moving currents	Endangered
Mammals			
Trichechus manatus	West Indian manatee	Fresh and salt water in large coastal rivers, bays, and estuaries	Endangered
Reptiles			
Caretta caretta	Loggerhead sea turtle	Open ocean; also inshore areas, bays, salt marshes, ship channels, and mouths of large rivers	Threatened
Chelonia mydas	Green sea turtle	Shallow coastal waters with submerged aquatic vegetation and algae, nests on open beaches	Threatened
Dermochelys coriacea	Leatherback sea turtle	Open ocean, coastal waters	Endangered
Eretmochelys imbricate	Hawksbill sea turtle	Coral reefs, open ocean, bays, estuaries	Endangered
Lepidochelys kempii	Kemp's Ridley sea turtle	Nearshore and inshore coastal waters, often in salt marshes; neritic zones with muddy or sandy substrate (NOAA Fisheries 2013)	Endangered
Pseudemys alabamensis	Alabama Red Bellied Turtle	Shallow backwaters of rivers, freshwater streams, bays, and bayous in areas with high abundance of SAV	Endangered

11.5.6.11 Threatened and Endangered Species Environmental Consequences

ESA Section 7 consultations would be conducted with the FWS and NMFS-Protected Resources Division. The Trustees intend to implement measures that are required by the USFWS and NMFS and would consider any additional practices that may emerge from additional regulatory consultations and summarize those in the Final ERP/PEIS.

To avoid and minimize adverse impacts to sea turtles and manatee, the NMFS "Sea Turtle and Smalltooth Sawfish Construction Conditions" and the FWS "Standard Manatee Conditions for In-Water Work" would be followed during all construction, maintenance, and monitoring activities.

To avoid and minimize impacts to Gulf sturgeon and marine mammals, pilings would be pushed into the soft sediment rather than driven. Pushing the pilings in place would minimize, to the maximum extent practicable, any acoustical effects that may be damaging to sturgeon individuals and marine mammals. During breakwater construction, the contractor would be made aware of the potential presence of sturgeon. If any sturgeons are observed during construction, work would cease until the sturgeon have moved away from the construction area.

To avoid and minimize impacts to the Alabama red bellied turtle, the proposed action area would be surveyed for the presence or absence of Alabama red bellied turtle, turtle nests, and appropriate shoreline habitat conditions. This survey would be conducted by an individual with experience conducting aquatic turtle surveys and handling turtles. Results of the report would be coordinated with FWS. During construction, the contractor would be made aware of the potential presence of the Alabama red bellied turtle. If any red bellied turtles are observed during construction, work would cease until the turtles have moved away from the construction area, including the shoreline.

Potential adverse impacts to wood stork, piping plover, and red knot would be avoided and minimized by conducting pre-construction nesting surveys, as discussed above. If any wood stork nests are located, the FWS would be contacted to develop conservation measures to protect the nesting wood storks during construction.

11.5.6.12 Threatened and Endangered Species Findings

The Trustees intend to implement measures that are required by the USFWS and NMFS and would consider any additional practices that may emerge from additional regulatory consultations and summarize those in the Final ERP/PEIS.

The proposed action would result in minor, short term adverse impacts to some manatee, gulf sturgeon, and Alabama red-bellied turtle individuals during construction since transient individuals would avoid the project area during construction. These potential adverse impacts would be short term (during construction), insignificant, and would not be likely to impact entire populations of species due to ubiquity of foraging habitat proximal to the project site. Long term minor beneficial impacts are expected to these species due to the increased foraging habitat resulting from the reef installation. Further, the potential adverse impacts would be minimized to the maximum extent practicable by following FWS and NMFS construction guidelines, conducting pre-construction surveys, and coordinating with FWS and NMFS.

There are no anticipated short to effects to sea turtles; however, minor beneficial long term impacts to sea turtles would be anticipated because conditions shoreward of the reef are expected to improve water clarity and result in conditions favorable for SAV, which are used as turtle foraging habitat.

The project is not likely to result in short or long term adverse or beneficial impacts to Alabama sturgeon, wood stork, piping plover, red knot, or beach mice.

11.5.6.13 Human Uses and Socioeconomics

Socioeconomics and Environmental Justice

Affected Resources

Socioeconomics

The project is located in Baldwin County, AL, more specifically in census tract 114.01 (see http://www.co.baldwin.al.us/uploads/Final_Report_webversion.pdf). The three major categories of industry (of those employed people 16 years and over) in this census tract are: retail trade, educational services/health care/social assistance, and construction (U.S. Census Bureau, 2007-2011 American Community Survey). Information regarding the county's demographics can be found in Table 11-5.

Table 11-5. Baldwin County demographic quick facts (2013).

PEOPLE		LABOR FORCE	
Population	190,169	Bachelor's Degree or higher	26.60%
Labor Force	91,168	High School Degree or higher	87.49%
Job Growth Rate	30.03%	White Collar Workers	56%
Unemployment Rate	7.60%	Blue Collar Workers	43%
Median Age	40.39	Universities in Community	1
		Universities in Community + 50 miles	7
		Community Colleges in Community	1
		Community Colleges in Community + 50 miles	9
Source: http://www.baldwineda.com/community-life/demographics/			

Environmental Justice

The relevant demographic data were obtained from the U.S. Census Bureau and the State of Alabama. Data are presented at the county level to accommodate the geographic size of each portion of the study area.

In this analysis, a county is considered to have a minority population if its nonwhite population is greater than 50 percent or is meaningfully larger than the general (statewide) nonwhite population. Low-income areas are defined as counties in which the percentage of the population below poverty status exceeds 50 percent, or is meaningfully greater than the general population (average statewide poverty level).

To make a finding that disproportionately high and adverse effects would likely fall on minority or low-income populations, three conditions must be met simultaneously:

- There must be a minority or low-income population in the impact zone.

- A high and adverse impact must exist.
- The impact must be disproportionately high and adverse on the minority or low-income population

The closest communities to the project site are Bon Secour and Magnolia Springs. In 2010, the populations of Bon Secour and Magnolia Springs were approximately 740 for each city. In the census tract where these communities are located, the minority population is between 10-20% (EPA 2013) (

Figure 11-7, below). In addition 15.7% of the households in the census tract are living below the poverty level (EPA 2013) (Figure 11-8, below). The EPA coordinates an environmental justice grant program that seeks to empower communities through education related to public health and environmental issues. One grant was issued for pollution prevention to the Creek Indians in Gulf Shores, Alabama. There are no documented brownfields or superfund sites in Baldwin County. In direct vicinity of the project site, the 615 acres Swift Tract along the Bon Secour shoreline is owned by the State of Alabama. Directly east of, and bordering the Swift Tract, is the 1,000 (+/-) acre Weeks Bay Mitigation Bank. Neither the Swift Tract nor the Weeks Bay mitigation banks contain residential, commercial, or recreational opportunities. Consequently, the proposed action will not directly influence any communities in close proximity to the shoreline.

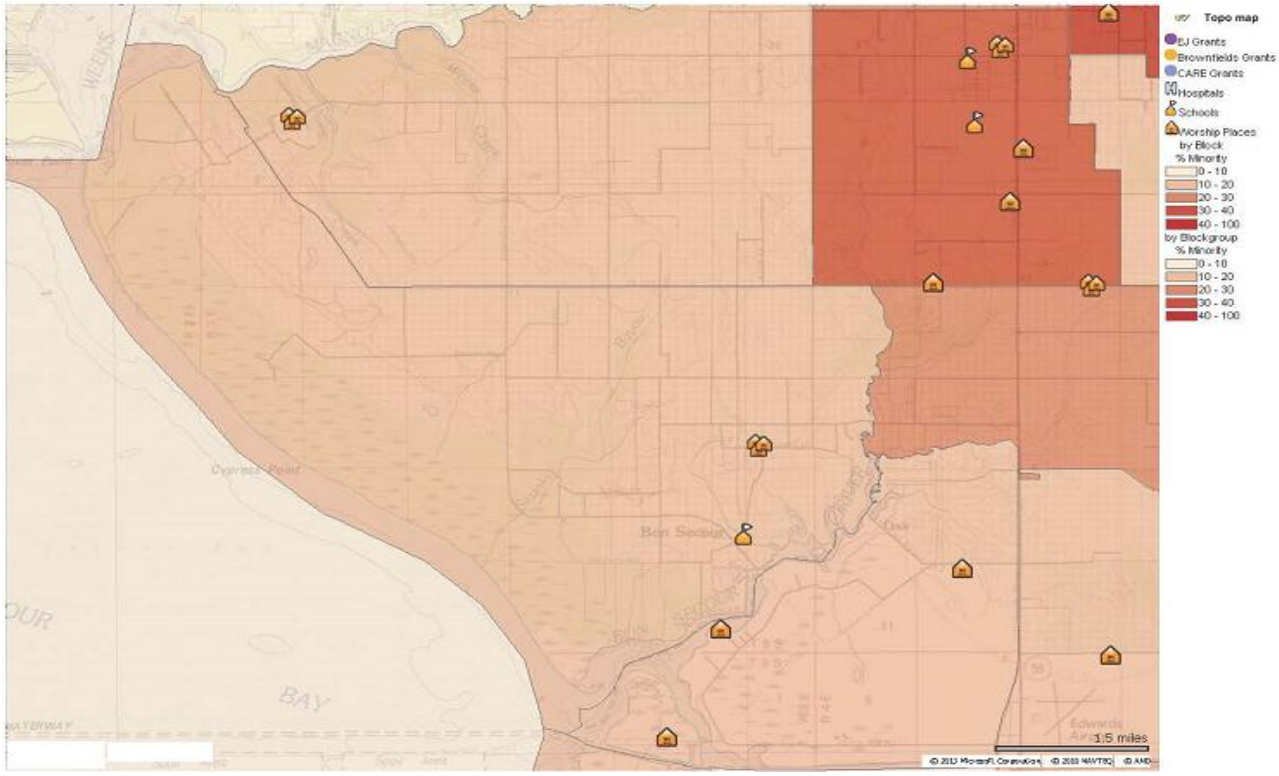

Figure 11-7. Minority population percent (EJViewer, EPA).

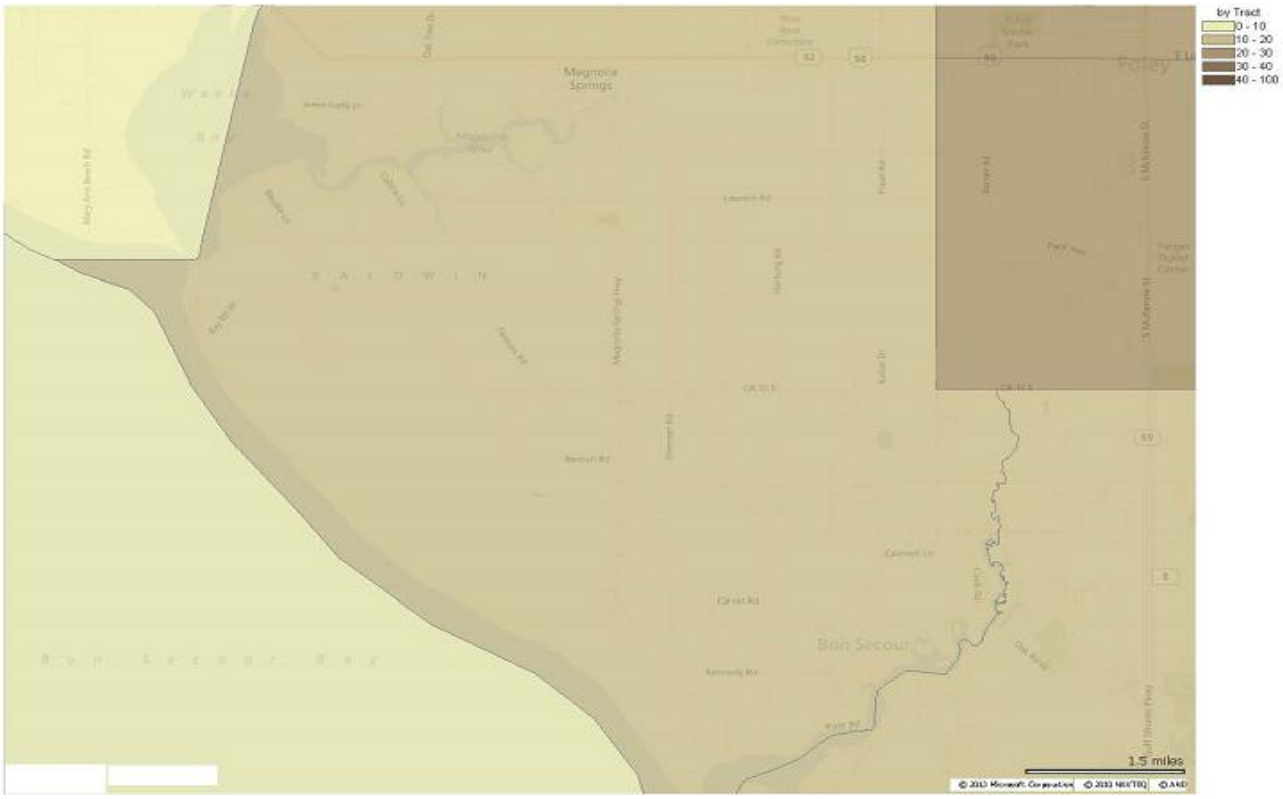

Figure 11-8. Percentage of households living below the poverty line (EJViewer, EPA).

Socioeconomic and Environmental Justice Environmental Consequences

It is expected that short term, minor, beneficial direct impacts would be found in the local community. Workers (estimated to be between 20 and 30 jobs during construction) who perform the labor during the construction phase would perform the construction jobs, those same employees would spend money in the community (lodging, food, services), and the newly strengthened shoreline and reef structures could entice new visitors to the NERR and provide additional recreational fishing in this portion of Bon Secour Bay. These benefits would be expected during the early stages of project construction and following completion of the project. Increased recreational opportunities are an expected long term benefit.

11.5.6.14 Socioeconomic and Environmental Justice Findings

It is expected that this project would result in short term, minor, adverse indirect impacts to those businesses that support visitors the NERR. The construction at the project site may deter some potential visitors, who would instead choose to visit at another time. The local businesses that support tourists would be negatively impacted due to the loss of revenue, but it is expected that this impact would be short term and minor. Minor beneficial effects are also anticipated during construction due to the crews that will be hired to complete the project. There would be no long term adverse or beneficial effects to socioeconomics. It is not expected that the action would result in disproportionately high and adverse effects affect minority populations, or low-income families in the short or long term.

11.5.6.15 Cultural Resources

Affected Resources

Impacts to cultural resources from the State of Alabama, federal, and Native American perspectives, including a survey of cultural resources, will be addressed as environmental review for this project continues. Management of Section 106 of the HPA compliance will be led by the Department of the Interior.

A list of properties in the Alabama Register, from Baldwin County was consulted. There were no properties found at the location of the project area. (http://preserveala.org/pdfs/AR/AL_Register_of_Landmarks_and_Heritage_List_June2013.pdf)

A list of AL properties in the National Register of Historic Places, from Baldwin County was referenced and there were no properties found at the location of the project area. (http://preserveala.org/pdfs/NR/NR_Properties_AL.pdf)

Environmental Consequences

There are no known cultural resources in the water where the project will be built or on the land adjacent to the project area; however, a Phase 1 historical resource survey of the action will be conducted and the results will be coordinated with Alabama SHPO and interested Native American tribes as environmental review continues. At this time, there are no expected adverse or beneficial impacts associated with this project.

11.5.6.16 Cultural Resources Findings

A complete review of this project under Section 106 of the NHPA would be completed as environmental review continues. This project would be implemented in accordance with all applicable laws and regulations concerning the protection of cultural and historic resources.

11.5.6.17 Infrastructure

Affected Resources

The project area is in the offshore water between Weeks Bay and Bon Secour Bay, AL. There are no roads that run parallel or perpendicular to the shore in the project area. The land is not developed for human habitation; therefore, there are no structures to support transportation, water supply, or utilities for over 2000ft from the nearest land to project area.

Infrastructure Environmental Consequences

There is no existing infrastructure at the project site. The logistics of the construction process are dependent upon the construction contractor. At this time, it is anticipated that the construction contractor would use existing land base docks and loading areas to stage rip rap and oyster materials along with construction equipment. There are several sources of commercial sources of rip rap and shell, and no one source has been specified. Nearby small boat launches may be used for personal access to the site. All the construction activities should be performed from water based resources with no activities on the shoreline adjacent to the site.

It is anticipated that one or more work barges with a backhoe with a long reach would be positioned along the seaward side of the submerged reef. A material barge would be positioned seaward of the work barge in sufficient depth of water, but within reach of the backhoe. The material barge would be loaded so as not to exceed the draft requirements in the work area. Placement of the rip rap would be monitored to insure the submerged reef dimensions, slopes and crest elevation is achieved. Dredging may be required to allow access to the site for the construction of the breakwaters. Dredged material would be side cast along the access channels. The dredged excavation and width would be minimized based upon the barge size and draft.

11.5.6.18 Infrastructure Findings

There would be no adverse or beneficial short or long term impact on the area's infrastructure resulting from the project.

11.5.6.19 Land and Marine Management

Affected Resources

Land Use

The land in the general area is a mix of public and private ownership. Nearby public land includes: Bon Secour NWR and the Weeks Bay NERR, part of the National Estuarine Research Reserve System. As for private ownership, there are homes, subdivisions, agricultural fields and office buildings in nearby towns; however, the land closest to the project area is part of the Weeks Bay NERR and would not be developed for human use.

Coastal Zone Consistency

The project is located in a coastal area that may be regulated by the federal CZMA of 1972, which is implemented through the Alabama Coastal Area Management Program (ACAMP). The CZMA defines coastal zones wherein development must be managed to protect areas of natural resources unique to coastal regions. In addition, the CZMA requires federal agency activities to be fully consistent with a state's approved coastal management program.

Land and Marine Management Environmental Consequences

New warning signs would be installed at the project site in the marine environment. Since the work is taking place on public lands, the implementing Trustee would need to adopt the reef structures and signage and maintain them in perpetuity. ADEM would be required to determine if the project is consistent with the CZMA. This process is typically completed during the COE CWA Section 404 permitting process and the ADCNR – State Lands Division permitting process.

This project is located in the State of Alabama's designated coastal zone. Therefore, the project would require a determination of whether the project is consistent with the CZMA and the ACAMP. The CZMA indicates that consistency is based on effects rather than a geographic boundary which means any federal activity or federally-funded activity that would have an effect on a state's coastal zone would be subject to a consistency review.

11.5.6.20 Land and Marine Management Findings

The proposed action would be constructed consistent with the CZMA and the ACAMP and would not result in adverse short or long-term impacts to land and marine management within the project area. . There would be a potential long-term beneficial impact to land management of the Weeks Bay NERR due to reducing shoreline erosion landward of the reef structure.

11.5.6.21 Aesthetics and Visual Resources

Affected Resources

The shoreline landward of the proposed action area is undeveloped, public land associated with the Weeks Bay NERR. There is currently no view of the project area from the shoreline or from the agricultural and residential properties east of the NERR. Bon Secour Bay is used for water-based recreation and visual receptors of the shoreline including recreational boaters. The current view from the water to the shoreline is unobstructed.

Aesthetics and Visual Resources Environmental Consequences

As a result of this project, new navigational signs would be installed at the project boundaries to warn marine traffic of the potential underwater obstruction. The signs (a total of 6) would not dominate the view or detract from the current user activities or experiences; however, the intent of the signage is to attract attention in order to inform the public for their safety.

11.5.6.22 Aesthetics and Visual Resources Findings

The proposed action would result in minor, short term visual impacts while construction equipment is used at the project site. The placement of these navigational signs would result in a direct, long term, minor adverse impact on the aesthetics and visual resources of the area.

11.5.6.23 Tourism and Recreational Use

Affected Resources

The affected resources include the waters and estuaries along the Swift Tract shoreline, which is in conservation. These resources are used by the public primarily for recreational boating, fishing, and bird watching. There is a boat launch north of the project site within Weeks Bay. The Bon Secour NWR is located south of the project site; however, no impacts to the NWR would be anticipated from project construction.

Tourism and Recreational Use Environmental Consequences

During construction of the breakwaters, 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. Following construction, there would be minor adverse impacts to public access and recreation since the reefs will prevent free-flowing transit between the reef and the shoreline. To avoid any significant navigational disturbances, permanent navigation markers or signage would be installed to assure safe navigation for marine traffic.

11.5.6.24 Tourism and Recreational Use Findings

The proposed action would have a short term, adverse impact to recreational use of the area during construction since the area would be avoided by recreational boaters. The action would result in a minor beneficial impact due to increased use of created reef for fishing due to the expected use of the reef by recreationally import fish such as speckled trout and red drum. The project would result in a long-term, minor adverse impact due to the placement of new navigational signs where none currently exist. The project would not result in adverse or beneficial long term indirect impacts to recreational use.

11.5.6.25 Public Health and Safety and Shoreline Protection

Affected Resources

As this area is not for residential use, the immediate area does not have public health concerns, waste generation, or safety issues. The area is experiencing some shoreline erosion, which prompted the need for this shoreline stabilization effort.

Public Health, Safety, and Shoreline Protection Environmental Consequences

The project would not expose the public to health or safety concerns and would lead to better protection of public and private land by offering some shoreline stabilization in the form of offshore reef structure.

11.5.6.26 Public Health, Safety, and Shoreline Protection Findings

There are no anticipated short term adverse or beneficial impacts expected. This project would result in long term, moderate beneficial impacts to shoreline protection.

11.5.7 Summary and Next Steps

Per the Purpose and Need of the Draft Phase III ERP/PEIS, four alternatives are considered, including a No Action Alternative (Alternative 1) each comprised of a selection of project types emphasizing habitat and living coastal and marine resources (Alternative 2), recreational opportunities (Alternative 3), or a combination of both habitat and living coastal and marine resources and recreational opportunities (Alternative 4). As proposed the Swift Tract Living Shoreline project implements restoration techniques within Alternatives 2 and 4.

The proposed Swift Tract Living Shoreline project would include shoreline and marsh protection and restoration and increased benthic secondary productivity. It would use breakwater material to prevent shoreline erosion and increase habitat for benthic species. The project is consistent with Alternative 2 (Contribute to Restoring Habitats and Living Coastal and Marine Resources) and Alternative 4 (Preferred Alternative).

Draft NEPA analysis of the environmental consequences suggests that while minor adverse impacts to some resource categories, no moderate to major adverse impacts are anticipated to result. The project would provide long-term benefits by creating approximately 1.6 miles of reefs. The Trustees have started coordination and reviews under the Endangered Species Act, the Magnuson-Stevens Fishery and Conservation Act, the Historic Preservation Act, the Marine Mammal Protection Act, the Bald and Golden Eagle Protection Act, Coastal Zone Management 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. Final determination on this project will be included in the final Phase III ERP/PEIS and Record of Decision.

11.5.8 References

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11.6 Gulf State Park Enhancement Project: Project Description

11.6.1 Project Summary

The proposed Gulf State Park Enhancement project would implement ecologically-sensitive improvements to Gulf State Park (GSP) including: (1) rebuilding the Gulf State Park Lodge and Conference Center; (2) building an Interpretive Center; (3) building a Research and Education Center; (4) visitor enhancements including trail improvements and extensions, overlooks, interpretive kiosks and signage, rest areas, bike racks, bird watching blinds, or other visitor enhancements; and (5) ecological restoration and enhancement of degraded dune habitat. Early Restoration funds would contribute $85,505,305, a portion of the total project costs.

11.6.2 Background and Project Description:

Experts estimated that almost 5 million barrels of oil were released into the Gulf after the April 20th explosion and before the well was finally capped. The spill exposed coastal areas of the Gulf states to large amounts of oil. In addition to injury of sensitive ecosystems and disruption of commercial fishing activities, recreational services of natural resources were also lost. Lost recreational uses along the Gulf beaches of Alabama were extensive due to repeated episodes of oiling, as well as the widespread public perception that the beaches were fouled. The spill led to large numbers of cancelled beach trips over the course of many months as well as cancelled fishing trips and oyster harvesting due to closure of waters. Alabama, along with the other states bordering the Gulf, is beginning a restoration process that includes projects designed to compensate for both ecological and recreational services losses. The Alabama Trustees received several hundred suggestions for Early Restoration projects, including the Gulf State Park Enhancement Project, as part of public comment processes implemented following the Spill. Even though only a portion of the funding for this project would be provided under NRDA, the project will be analyzed in its entirety. Key elements of the project include the following:

Rebuilding the Gulf State Park Lodge and Conference Center. The original Gulf State Park Lodge and Conference Center, was destroyed in 2004 by Hurricane Ivan and would be rebuilt as a 'green' overnight stay and meeting facility. Building design and construction would be undertaken with the goal of certification under the LEED and/or Living Building Challenge programs, so as to minimize the facility's impact on the environment and establish it as a model for regionally-appropriate coastal zone design. The new building would provide state-of-the-art meeting facilities, overnight accommodations, and ecologically based amenities in a natural environment. There would be approximately 350 rooms at the lodge, with meeting space capable of accommodating approximately 1,500 people. The rebuilt lodge would also serve to assist Gulf State Park in providing additional interpretive services addressed by other project elements.

Interpretive Center. The park's environmental education and research programs for youth groups and adult visitors would be expanded to promote improved understanding of the ecological services provided by Alabama's limited and unique coastal natural resources. The expansion of environmental programs for visitors would be accomplished through several key improvements. An interpretive center would be constructed adjacent to the existing beach pavilion (see site plan) with meeting and classroom space and indoor and outdoor exhibits devoted to ecosystems and the ecological services they provide. Outdoor exhibits will focus on ecosystem stewardship and will include dune enhancement integrated

with an interpretive boardwalk. Visitor orientation and interpretive exhibits would be incorporated into all public spaces, using the interpretive center as well as the rebuilt Gulf State Park Lodge and Conference Center (described above) to highlight the natural history of Alabama's coastal areas—especially marine and dune systems located within the park.

Research and Education Center. The park's existing environmental education facilities would be expanded, including construction of a research and education facility adjacent to the park's existing nature center with classrooms and laboratories, and overnight and eating facilities to support a year-round program of K-12 environmental education focused on improved scientific understanding Alabama's Gulf coast ecosystems.

Visitor Enhancements. Various visitor enhancement elements would be implemented, including construction of recreational trails throughout the park for walkers, runners, cyclists, and other users that provide a greater interconnection with the existing trail system. The proposed trail enhancements are extensions of existing trails that would create loops and provide increased recreational opportunities and encourage the use of the trails as transportation between various park amenities. There would be approximately 13 miles of improvements with approximately 9.5 miles of new trails and approximately 3.5 miles of enhanced trails. Trail enhancements may also include overlooks, interpretive kiosks and signage, rest areas, bike racks, bird watching blinds, or other visitor enhancements.

Ecological Restoration and Enhancement of Degraded Dune Habitat. Ecological restoration would target degraded dunes adjacent to the proposed re-established lodge and to the west of the existing beach pavilion. The dune restoration zone would be approximately 145 acres, within which approximately 50 acres of dunes would be restored. Restoration would include creation of sand movement corridors at strategic locations to allow for the natural buildup of dunes behind the man-made berm. Selection of locations for sand movement corridors would be based on several factors including existing breaks and established vegetation. This selection would also include coordination with the U.S. Fish and Wildlife Service (USFWS) immediately prior to work commencing. The dunes would then be restored and enhanced by planting native vegetation such as sea oats (*Uniola paniculata*), sand oaks (*Quercus geminata*) and/or seaside bluestem (*Schizachryrium maritimum*). Dune vegetation would stabilize existing dunes and allow for sand accretion, thus increasing the areal coverage of dunes.

11.6.3 Evaluation Criteria

The goal of the Gulf State Park Enhancement Project is to provide partial compensation for recreational services lost as a result of DWH injuries to the natural resources of coastal Alabama. While the Trustees' assessment of lost services is ongoing, it has been clear since the summer of 2010 that the Spill resulted in very large negative impacts on recreational use in and around the Gulf. The State currently anticipates that the ongoing analyses will show the oiling of Alabama's coast caused losses in beach use, fishing and boating that number in the millions of user-days.

Offsetting the injuries from a loss of this magnitude requires a recreational use restoration program of unprecedented magnitude. Given Alabama's limited Gulf Coast (approximately 53 miles) and the fact that only a small portion is public land under the control of the State, identification of restoration

projects that can be implemented by the Trustees and that are large enough to provide a significant contribution towards compensating for the recreational use losses is challenging.

The Alabama Trustees considered a range of project types to determine how best to proceed with Early Restoration projects aimed at restoring lost recreational use. In addition to the Gulf State Park initiative, the Trustees considered land acquisition, smaller scale beach and boating access improvements, and development of nearshore artificial diving and fishing reefs. This set of initiatives represents the core set of project types that have been used historically to compensate for recreational use losses in natural resource damage restoration plans.

To evaluate each of these projects or project types, the Trustees considered the magnitude of the benefits that would be provided by a project (or a series of projects) in each of the categories, the cost-effectiveness of projects in providing recreational use benefits, and the overall likelihood that the Trustees would be able to successfully implement the effort as 'early restoration.' Secondary considerations included benefits to local economies, the level of co-benefits provided by a project (e.g., ecological improvements), administrative efficiency and strength of local support.

Based on their evaluation, the Trustees concluded that the Gulf State Park Enhancement Project (1) would provide a large contribution towards increasing access to the State's coastal natural resources; (2) would create recreational user-days in a cost-effective manner; and (3) could be successfully implemented in a relatively short timeframe given the State's control of the land and its previous progress towards obtaining the permits required for development in the Park.

In summary, the Gulf State Park Enhancement Project meets the evaluation criteria established for OPA and the Framework Agreement. As a result of the Spill, the public's access to and enjoyment of the natural resources along the Alabama Gulf Coast was denied or severely restricted. Completion of the project would enhance the public's use and/or enjoyment of natural resources, helping to offset adverse impacts to such uses caused by the Spill. Because this project would meet the Trustees' goal of restoring lost recreational uses by enhancing and increasing shoreline recreation opportunities, 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 the region by ADCNR. 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). 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 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 X). As a result, the project is considered feasible, cost effective, and consistent with long-term restoration needs (See C.F.R. § 990.54(a)(1),(3),(4) and Sections 6d-6e of the Early Restoration Framework Agreement). Projects to provide lodging and conference facilities, provide additional interpretive and education facilities, construct trail enhancements, and restore dunes were suggested as restoration measures during NOAA's public scoping meetings for the Deepwater Horizon PEIS, and also as part of public comment submissions.

The other projects and project types considered in the Alabama project selection analysis would all also make contributions to restoring recreational uses, but on a smaller scale, and will be considered as part of the final restoration plan for the spill.

11.6.4 Performance Criteria Monitoring and Maintenance

Performance monitoring is planned for each of the major subcomponents of the Gulf State Park Enhancement Project. Monitoring is needed to address both recreational use and ecological project performance.

The lodge and meeting facilities are designed to increase public access to Alabama's coastal natural resources. To document the recovery of lost recreational use, park authorities would make available annual information on total number of visitors to the rebuilt lodge, lodge occupancy rates, average length of stay, and the state of origin for visitors. In addition, information will be assembled each year for at least five years on the number of visitors attending meetings at the facility.

The new interpretive, education and research facilities and trails are also expected to attract new visitors to the park and enhance their experiences. GSP park managers will provide a description of the interpretive, educational and research programs conducted and monitor participation in these programs on an annual basis. Data would include the number of participants by program and the length of the programs attended.

As a broader measure of the impact on visitation of park enhancements, park managers plan to assemble annual data on the total number of visitors to the park. This type of information has been collected extending back as far as the early 1990s and will provide a basis for long-term comparisons of park visitation, including comparisons to the time when the previous Gulf State Park Lodge was operating.

Ecological performance monitoring is necessary for two aspects of the GSP enhancement project. First, the dune restoration work would involve planting to stabilize dunes in the park. A monitoring plan would be implemented to ensure the establishment and survival of transplanted species. The growth and extent of coverage by transplants would be documented and, if required, replanting performed. Replanting would be performed if species survival, of the original enhancement stock, falls below 75 percent. Photographic documentation would be available for the newly stabilized areas. Also, sand fencing will be monitored, maintained, repaired, and replaced as necessary over the monitoring period. The duration of the monitoring plan would be established as a condition to the permit and through agency coordination.

Construction of the lodge would require wetlands mitigation. At least 0.228 acres of emergent wetlands would be created on-site to offset a 0.076 acre area of impacts—a 3:1 mitigation ratio. A multi-year monitoring plan would be implemented at the newly created wetland. The approved wetland mitigation plan requires a 5 year monitoring event to document success of the wetland. This monitoring plan would include quarterly monitoring during the first year after construction and semi-annual monitoring for the next four years. Monitoring would document surface and subsurface water depths; vegetation growth and coverage; invasive species coverage and removal efforts; and wildlife observed in the wetland. Photographs of the site would also be provided. In the event it is determined that the

mitigation areas are not achieving success, then adaptive management strategies including but not limited to the evaluation of alternate sites, use of commercial banks, and other sources of mitigation credit will be evaluated (Volkert, Wetland Mitigation Plan, July 2013).

There would also be monitoring during dune restoration and throughout the construction activities for the trails, lodge, and the education and interpretive facilities. This would ensure that all these activities comply with the full set of environmental permit conditions, including conditions relating to endangered species like the Alabama Beach Mouse. The specific monitoring requirements during construction would be defined in conjunction with the final permits for work at the site.

11.6.5 Offsets

NRDA Offsets are $171,010,610 expressed in present value 2013 dollars to be applied against the monetized value of lost recreational use provided by natural resources injured in Alabama, which will be determined by the Trustees' assessment of lost recreational use for the Oil Spill. Please see Chapter 7 of this document (Section 7.2.2) for a description of the methodology used to develop monetized Offsets.[3] These Offset types and amounts are reasonable for this project.

11.6.6 Costs

Early Restoration funds contributing to this project would be $85.5 million. Construction of the interpretive center and research and education facility, enhancement of trails, and dune restoration would all receive 100% funding, and approximately $58.5 million would be put toward the construction of the lodge. Additional funds needed to construct the lodge (depending on final design and budget) would come from other non-NRDA sources. These costs reflect 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] 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.

11.7 Gulf State Park Enhancement Project: Environmental Review

The proposed Gulf State Park (GSP) Enhancement Project (proposed project) includes improvements designed to enhance access and improve visitor experience, restore degraded ecosystems, and provide an expansion of the park's environmental education programs to further tell the story of the diverse ecosystem found at GSP. The proposed project serves as cost-effective compensation for the loss of recreational use along the Alabama Gulf Coast as a result of the Deepwater Horizon (DWH) oil spill in 2010. National Resource Damage Assessment (NRDA) funds that would be allocated to this project are $85,505,305, a portion of the total project cost. The five project components are described in detail above in section 11.2.

11.7.1 Introduction and Background

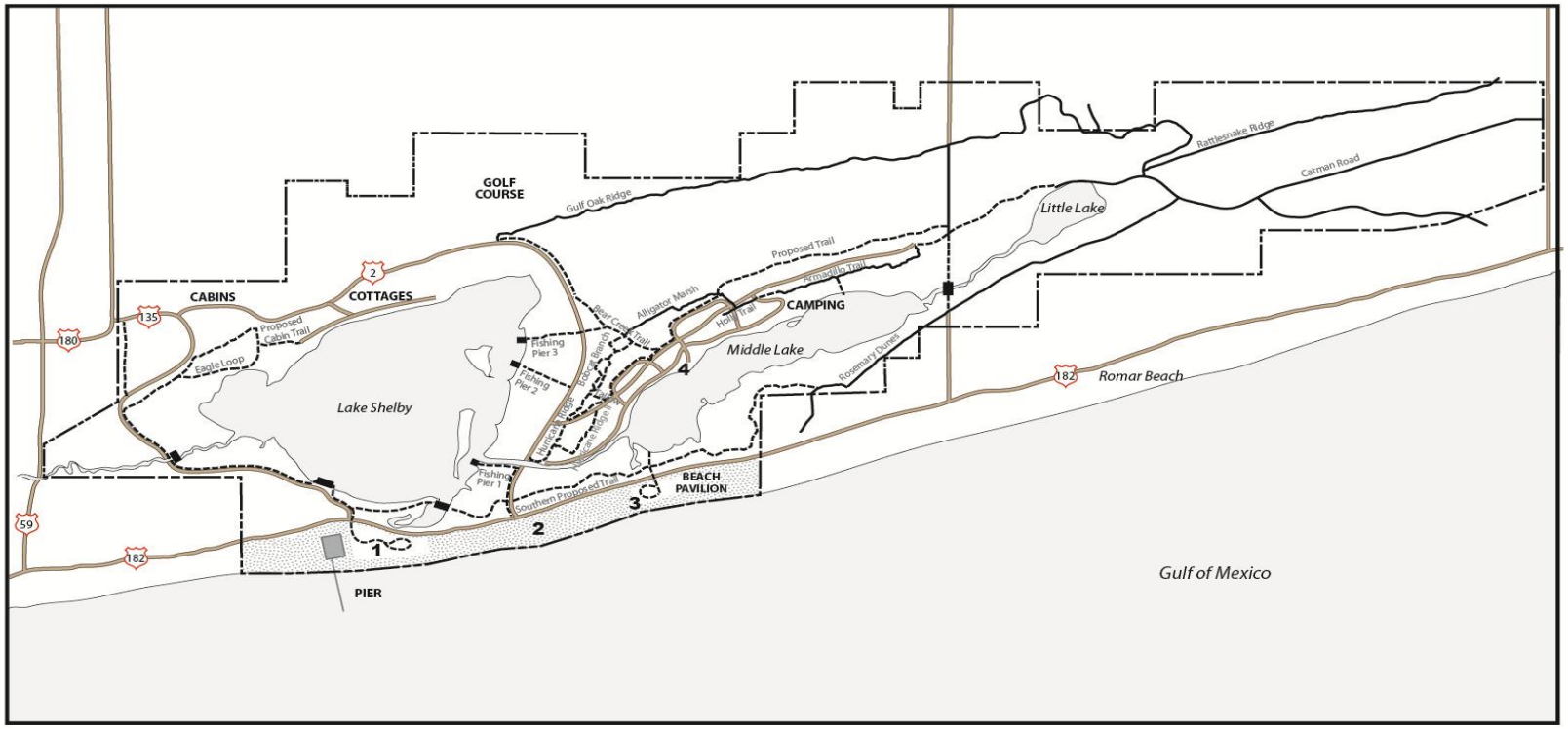
In April 2010, a blowout and explosion on the British Petroleum (BP) DWH drilling platform in the Gulf of Mexico resulted in the estimated release of almost 5 million barrels of oil into the Gulf as discussed earlier in this document. The Trustees identified projects for the Early Restoration efforts which are intended to begin the process of making Alabama whole for the natural resource injuries suffered as a result of the DWH oil spill. The overall selection of Early Restoration projects was designed to compensate for the loss of recreational use natural resource services; injuries to shorelines and shoreline biota (i.e., marshes and beaches); and injuries to the water column, including impacts to biota that live in or depend an unpolluted water column. Because of Alabama's relatively short coastline and limited public ownership along the coastline, it was a challenge to identify an appropriately scaled project that would compensate for the very large loss of recreational use.

The State of Alabama considered recreational use projects provided through public submissions. Overall, multiple recreational use project types were analyzed to determine which ones had the greatest potential to improve visitor experience, increase visitation and access to natural resources, and help restore the unique natural resources found along the Alabama Gulf coast. In addition to the proposed project, other projects considered include implementation of artificial reefs, boat ramps, boardwalk and campground improvements, and beach access. The proposed project was selected because it would best meet the primary and secondary objectives identified by the Trustees, offer the best restoration and protection of unique natural resources, and provide substantial new and enhanced visitor opportunities.

11.7.2 Project Location

The proposed project is located in the city of Gulf Shores in Baldwin County, Alabama. The 6,150-acre park is adjacent to the Gulf of Mexico and includes both white sand beaches and backcountry areas. Orange Beach is located to the east. Access to the park is provided by Alabama State Roads (SR) 182 and 135. The park is approximately 49 miles from Mobile, Alabama, and approximately 33.7 miles from Pensacola, Florida. Figure 11-9 presents the location of the proposed project, and Figure 11-10 shows the location of each individual project element.

Figure 11-9. Gulf State Park vicinity map.



Gulf State Park Project Locations

N

0 2,000 4,000

Scale in feet

LEGEND

- Gulf State Park (6,150 acres)
- Existing Road
- Existing Trail
- Proposed Trail Improvement
- Proposed Pier/Bridge
- 1 Proposed Lodge
- 2 Proposed Dune Restoration Zone
- 3 Proposed Interpretive Center
- 4 Proposed Research/Education Facility

Figure 11-10. Project element locations.

11.7.3 Construction and Installation

The Alabama Department of Conservation and Natural Resources (ADCNR) places a strong emphasis on avoiding, minimizing, and mitigating potentially adverse environmental impacts. To help ensure the protection of natural and cultural resources and the quality of the visitor experience, the following measures would be implemented during project construction. The ADCNR would implement an appropriate level of monitoring throughout the construction process to help ensure that protective measures are being properly implemented and achieving intended results.

Biological Resources

- All requirements for construction in the 2003 Habitat Conservation Plan for GSP would be followed, including proper disposal of refuse, installing signage during construction, trapping Alabama beach mouse on the site prior to construction, coordinating with the U.S. Fish and Wildlife Service (USFWS) if any Alabama beach mice are encountered, implementing a dune management program, installing informational signage on the role of the dunes for the Alabama beach mouse, regulating limitations on lighting that illuminates the primary dunes, implementing trapping efforts for predators, and a prohibiting pets in the area. For full details, see the Gulf State Park Habitat Conservation Plan (Volkert, 2003 as amended).

Stormwater Management

Stormwater inspections would occur to ensure compliance with all applicable water quality standards. Inspections would continue throughout the construction of the project until all sites are considered completely stabilized per the Alabama Department of Environmental Management (ADEM) National Pollutant Discharge Elimination System (NPDES) Permit.

Soils

- Most elements of the proposed project would require soil disturbance, either on a large scale for re-establishing the Gulf State Park Lodge and Conference Center or on a small scale for portions of the trail sections. Any time soil is disturbed, there is an increased potential for erosion if the displaced soil is not properly secured using best management practices (BMPs). Environmental permitting for these projects would require erosion and sedimentation (E&S) plans to obtain building permits from the municipality. E&S plans ensure that erosion and sedimentation are minimized by using BMPs, including:

  - Cordoning off the work area with silt fences.
  - Covering piles of removed soil with sod to keep it in place.
  - Salvaging and reusing topsoil either in place or in other project areas.
  - Revegetating the area with native species so bare soil is no longer present.

Vegetation

- Minimize the removal of vegetation whenever possible.

Health, Safety, and Accessibility

- Install appropriate barriers, safety fencing, and/or signs as appropriate, prior to initiating construction activities on GSP properties. The objective of these measures would be to protect visitors and allow safe passage across or around the construction area.

- The site would be open to visitors during construction; however, when appropriate and as a safety precaution, safety zones may be established within which visitors would not be allowed. The contractor would post personnel along safety zones to inform visitors of ongoing construction.
- All building construction would follow State of Alabama building codes and be built to address hurricane conditions.

Cultural Resources

- All proposed project areas have been evaluated for cultural resources and consultation with the State Historic Preservation Officer (SHPO) has occurred. If archeological resources are discovered during construction, all work would halt immediately in the vicinity of the discovery until the resources can be identified and documented and an appropriate mitigation strategy developed. In the unlikely event that human remains, funerary objects, sacred objects, or objects of cultural patrimony are discovered during construction, provisions outlined in the Native American Graves Protection and Repatriation Act (25 U.S.C. § 3001) of 1990 would be followed.

Sustainable Design

All proposed structures would be built to maximize sustainability and serve as examples of green design. Elements of such green design could include:

- Outdoor education and active learning features such as exhibits, interpretive signage, and access tools to get visitors out into the park and promote environmental education.
- Interpretive trails that explain shore ecosystems and conservation strategies for endangered species.
- Indoor environmental education highlighting resource conservation features of the lodge such as recycling, water and energy conservation, and resilient coastal design.
- Exterior lighting that is friendly to turtle hatchlings and nocturnal Alabama beach mice.
- Stormwater and habitat areas that are maximized by locating parking beneath buildings.
- Sand movement that is unimpeded by site features to permit natural dune replenishment.
- Pervious pavement that reduces downstream stormwater quality impacts of paved areas.
- Roof and paved surfaces that reflect light and heat to improve comfort and reduce energy load.
- A “car-free” experience where bicycles may be provided for use during lodge stay.
- Walkways and trails that connect lodge guests to the main park trail system, local services, and businesses.
- Employee changing rooms and bike storage that make alternative travel comfortable.
- Alternative travel options such as fuel efficient cars and van pools that are rewarded with priority parking.
- Resilient structures that resist storm damage and allow easy renovation post-storm.
- Limited finish materials to reduce post-hurricane waste.
- Shading devices that are integrated with the structure to limit post-hurricane waste.
- Insulated concrete blocks with light-reflecting surfaces to reduce energy load.
- Hurricane shutters and impact glass to reduce post-hurricane waste.

- Structure and flexible interior layout to allow adaptation throughout the building's life.
- Efficient HVAC system that provides comfortable interior at minimum energy expenditure.
- Elevators that generate electricity on the way down to power the ride up.
- Energy-efficient TVs, lights, and other in-room appliances to reduce energy demand.
- No permanent irrigation system; native plants that rely on rainfall to reduce water use.
- Water conserving and non-toxic pool equipment to limit the environmental impact of the swimming pool.
- Overall, green design of all facilities would serve as a centerpiece for explaining sustainable siting and construction in the coastal environment.

The project is planned to be completed over a two-year timeframe. Specific details related to construction for each project site are provided below.

11.7.3.1 Re-establishment of Gulf State Park Lodge and Conference Center

Gulf State Park Lodge and Conference Center preliminary plans call for development of an approximately 22-acre site east of the existing Gulf State Pier. Site plan and building design options were evaluated during preliminary design to determine a development strategy that would minimize the footprint of the lodge buildings to allow maximum pervious area, optimize building orientation for energy efficiency, and minimize the visual impact of the structure. The building would include sustainable design features and may seek LEED, Living Building, or similar certification including energy efficient design and native habitat oriented site development. Development would be restricted to previously disturbed areas associated with the demolished lodge and DWH recovery staging area. The proposed site plan reserves approximately half of the development area for landscape uses including circulation, lodge guest-related recreation features such as pools and terraces, a publicly accessible interpretive landscape that includes preservation of an existing wetland and remnant scrub dune, creation of an interdunal swale for stormwater management, and creation of secondary and scrub dune habitat. The site location and layout of the proposed re-establishment of the lodge and conference center is shown in Figure 11-11.

Buildings

Preliminary designs indicate that three buildings would be located parallel to the shore along the seaward south edge of the site with a fourth building located perpendicular to the other three buildings. The building program would include approximately 350 guest rooms and a meeting facility for up to 1,500 attendees. The proposed buildings would be hurricane-resistant pile-supported structures with the first habitable floor located above the base flood elevation, and they would vary in height from four to six levels including ground-level parking, a partial floor for service functions, one to three levels of guest and meeting rooms or parking, and a roof level. Green roof decks would extend from the guest wings to provide complete cover of all ground-level parking as well as additional stormwater treatment features and guest amenities. A side profile of the proposed building is shown in Figure 11-12.

The first line of piles would be located a minimum of 60 feet from the Coastal Construction Line (CCL) to avoid impact to the existing primary dune during construction. The pile field would extend approximately 150 feet landward for shore-parallel buildings and approximately 360 and 420 feet, respectively, for the meeting facility and perpendicular guest wing.

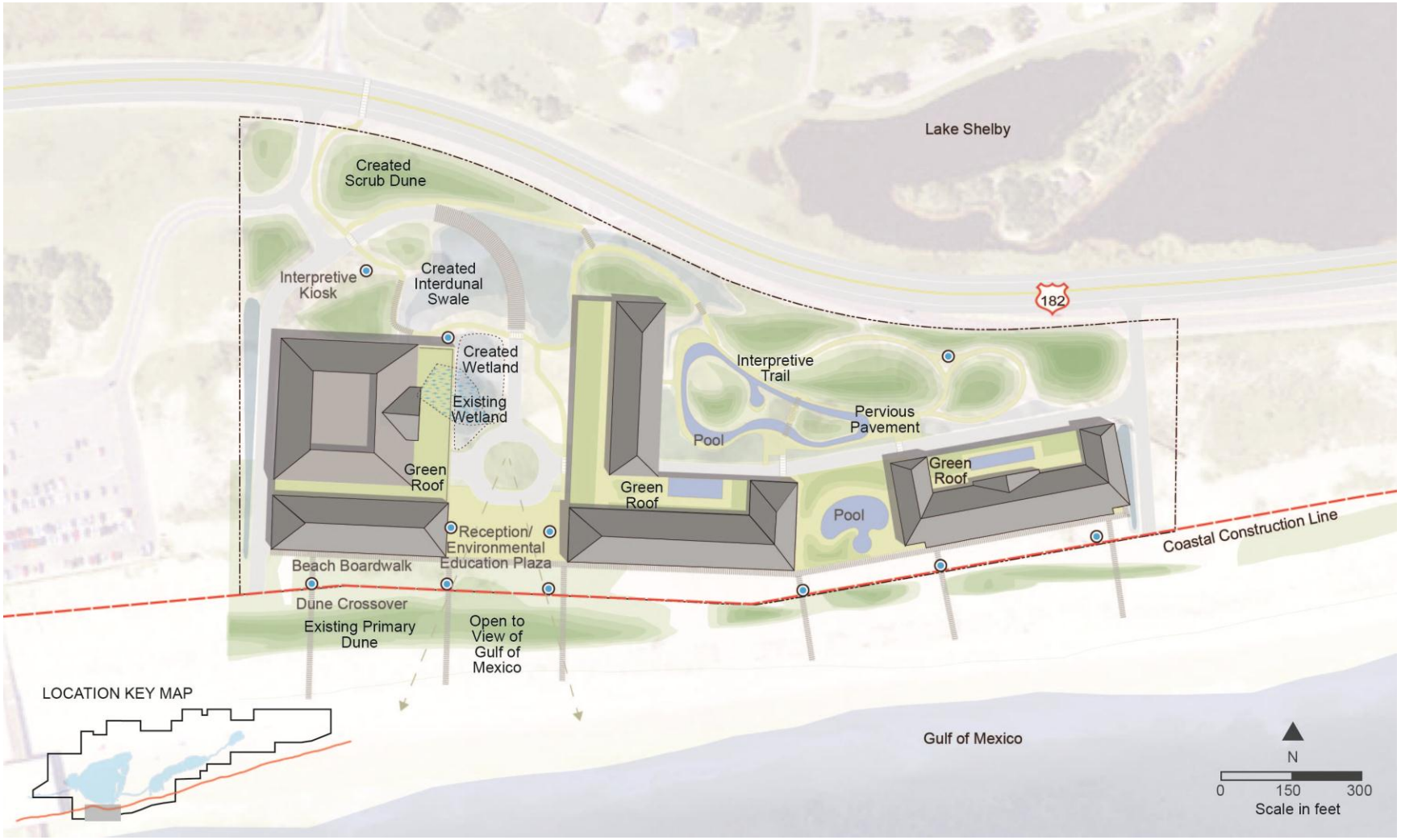


Figure 11-11. Gulf State Park Lodge and Conference Center preliminary design – conceptual site plan.

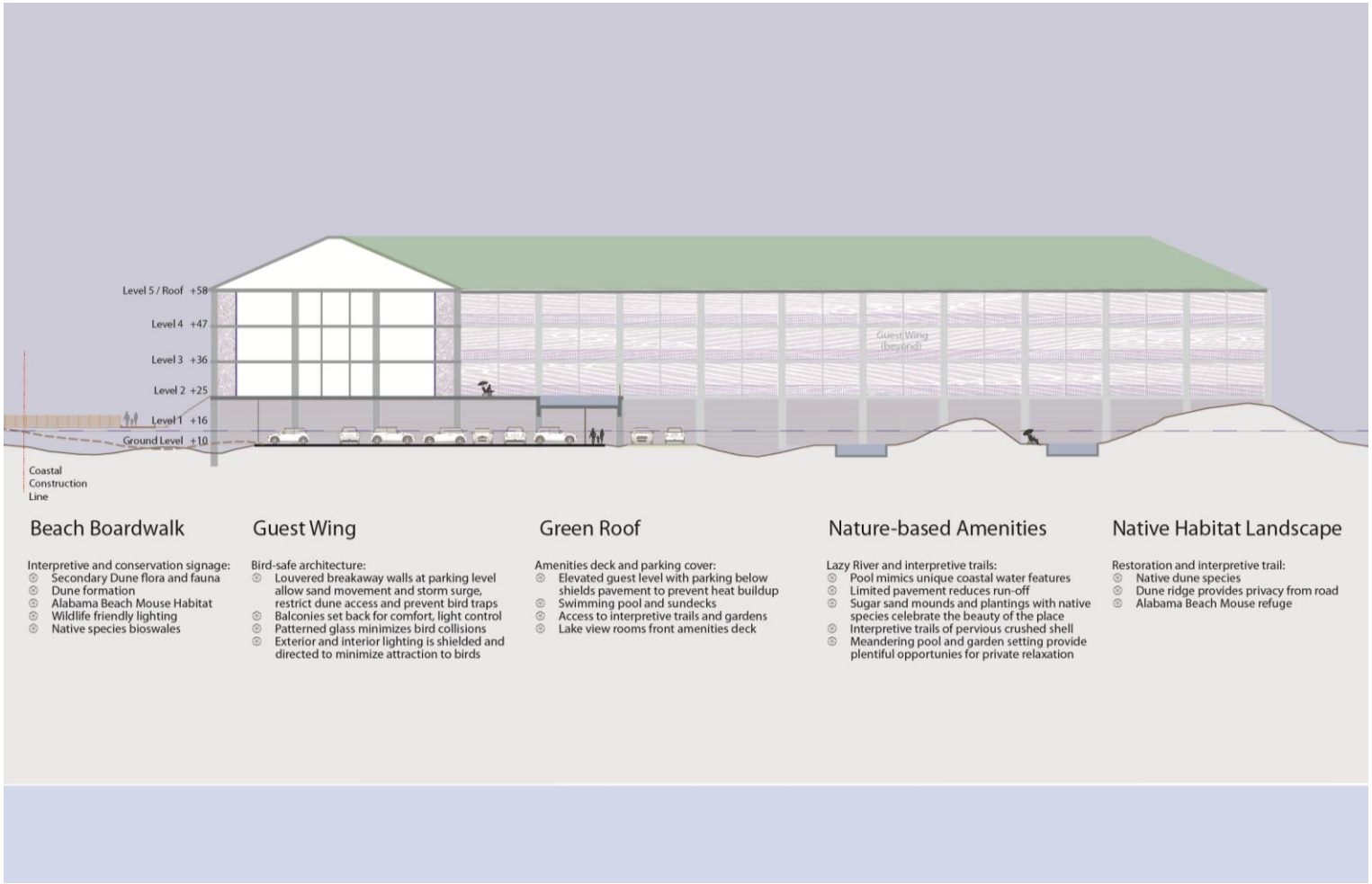


Figure 11-12. Gulf State Park Lodge and Conference Center preliminary design – conceptual site section.

Utilities
Water, sewer, and electrical services exist on the site, requiring only extending utility transmission lines from the street connections to the facilities. Trenching for new lines would follow best practices identified under *Construction Activity*.

Circulation
Circulation features would include the entrance drive and drop off, a publicly accessible reception plaza with environmental education exhibits, and access to a beach boardwalk and interpretive trails. Fire lanes would be provided at the east and west ends of the site with access to the beach and along the north side of the guest wings and through the pool deck area.

Grading
The entire development area is previously disturbed with limited native topography. A created primary dune berm is located immediately south of the site seaward of the CCL. There is limited secondary dune topography landward of the primary dune because the site was previously graded flat for the development of the demolished lodge. Existing topography consists of a moderate slope rising from the northern site boundary along SR 182 to a flat plateau at approximately elevation +10 feet where the demolished lodge was located. Approximately 6 acres of asphalt remaining from the demolished lodge occupy the central area of the site and will be demolished and stockpiled for recycling on site as fill. There are no existing structures and therefore demolition debris is anticipated to be limited to asphalt. A cultural resources assessment of the proposed site (AHC 02-1415)(Nielsen, 2002a) did not produce any artifacts, cultural features or deposits, or archaeological sites, resulting in concurrence by Alabama Historical Commission on September 17, 2002, that "no further cultural resources considerations are…necessary" and that "No National Register of Historic Places properties are present in the vicinity of the assessment area" (Nielsen, 2002a).

The proposed lodge ground floor level would be established at the elevation of the existing plateau to minimize site grading would balance fill with spoils stockpiled during rough grading along the northern boundary and contoured during landscape development to establish a dune ridge parallel to SR 182. The dune ridge would provide privacy for the recreation areas located on the north side of the lodge and establish a band of scrub dune habitat. This site feature together with the existing primary dune would provide spatial definition to the site by creating an interdune area within which all the site features are organized. The interdune area would also facilitate stormwater management incorporating a flat depression formed between successive dune ridges that vary from flooded to completely dry depending on rainfall.

Drainage
The proposed site organization allows for stormwater BMPs to be implemented. Stormwater strategies include avoiding unnecessary impervious surfaces by locating parking beneath the buildings. The compact building/parking footprint would minimize runoff and allow for the maximum pervious site cover with natural surfaces that slow run off and allow infiltration and percolation. All stormwater would be treated for quality and quantity control through a combination of BMPs including detention and treatment on green roofs and infiltration in created wetlands and swales.

Planting
Landscape plantings would be restricted to native species typical of the habitats existing or to be created on the site including wetlands and primary, secondary, and scrub dunes. The stormwater swales would be planted with native facultative wetland indicator species such as Sea Oxeye Daisy (*Borrichia frutescens*), Smooth Cordgrass (*Spartina alterniflora*), Sand Cordgrass (*Spartina patens*), and Black Needlerush (*Juncus effusus*) and would be interpreted as a model sustainable landscape practice for coastal areas. Native plants for revegetation would be contract grown using seeds or cuttings collected on site for difficult to source and hard to establish species including Sand Live Oak (*Quercus geminata*). A restoration planting plan would be developed during schematic design, and a nursery contract would be established to grow sufficient numbers of the specified plants to fulfill the planting scheme within the construction timeframe and avoid exposed areas of bare soil.

Existing Vegetation
The existing primary dunes located outside the development area south of the CCL have been revegetated with native dune species in a series of dune enhancement projects. Vegetation is primarily Sea oats (*Uniola paniculata*). The proposed buildings would be located to provide a buffer zone between the lodge and the growing primary dune line. A boardwalk and dune crossings would be located within the 60-foot buffer zone landward of the CCL. Dune crossing locations would correspond with existing low saddles along the primary dune line. The boardwalk would be located above the base flood elevation (BFE), and level with the second level of the buildings. This elevation also corresponds with the current primary dune crest. The elevated boardwalk, location of crossings at saddles, and the landward buffer area would foster dune protection and continued dune development. Dune enhancement would continue landward of the dune ridge and would include the placement of sand fencing and planting with native dune species including predominantly Sea Oats (*Uniola paniculata*), obtained from local nurseries, and other dune grasses to promote sand accretion as well as back dune perennials and shrubs to establish a dense secondary dune habitat. Access to the beach would be at designated crossings only and would be reinforced by the dense planting within the buffer zone and with signage. Louvered break away panels would prevent access from the ground-level parking areas directly into the dune landscape.

The building footprint would impact a small 0.076 acre portion of an existing 0.18 acre wetland that consists primarily of cogon grass, which is listed as a Category 1 invasive species by the Alabama Invasive Plant Council. A 0.076 acre portion of the wetland would be filled and the remaining 0.104 acre would be preserved and augmented with approximately 0.23 acre of created mitigation wetlands adjacent to the preserved wetland. Areas where cogon grass is identified will be intensively treated with herbicide to eradicate it from all areas of the construction zone and Action area of the HCP. Equipment working in areas of cogon grass will be decontaminated before leaving the site or working in areas free of cogon grass. The HCP, Dune Management Plan, and Wetland Monitoring Plan all require monitoring for and treatment of invasive species. An existing 0.09-acre scrub dune with mature *Quercus geminata* and other scrub dune species would be preserved on the north side of the meeting facility and provide seeds for use in site revegetation.

Construction Activity

Construction activities associated with the proposed project are expected to be typical of other similar construction projects and would include mobilization of equipment, site preparation, delivery of construction materials using heavy-duty trucks, pile driving, placing foundations, pouring concrete and installing building components, and providing utility connections. During the various phases of construction, on-site equipment may include a hydraulic crane, front-end loaders, backhoes, concrete mixing and pumping trucks, generators and compressors, and welding machines.

Construction staging would likely be established south of the spoils stock piles and use existing driveways remaining from the demolished lodge. Building construction would use heavy equipment to establish the pile field that will support the buildings. During construction, all necessary soil stabilization measures appropriate for coastal construction will be employed to control water and wind erosion of exposed sand areas including avoiding earthmoving activities during drought conditions and placement of wind fences to control wind movement. Scheduling of construction activities would ensure that the least amount of area is disturbed at any one time. Where existing vegetation exists, it would be left in place as long as possible or throughout construction in areas near the final grade of the site. Other soil stabilization measures may include temporary or permanent erosion control blankets, chemical erosion control using water-soluble anionic polyacrylamide (PAM) with or without mulching. Seeding would not be conducted until fine grading and landscape planting occurs. As required by the Habitat Conservation Plan, straw or straw bales would not be used during construction to avoid potential seed establishment of exotic or invasive plant species on the site. Exposed sand stockpiles would be temporarily stabilized using an appropriate erosion control fabric to prevent wind erosion and establishment of exotic plant species. Equipment working in areas of cogon grass will be decontaminated before leaving the site or working in areas free of cogon grass. The HCP, Dune Management Plan, and Wetland Monitoring Plan all require monitoring for and treatment of invasive species.

11.7.3.2 Interpretive Center

The proposed interpretive center includes initiatives aimed at increasing the public's awareness and understanding of coastal Alabama. Project plans envision construction of an interpretive center with approximately 3,500 square feet of indoor ecosystem exhibits and meeting spaces located adjacent to the existing beach pavilion, as shown in Figure 11-14. The interpretive center would be pile-supported, hurricane-resistant construction. Details of building construction would be determined during design development and, similar to the lodge, would include sustainable design features and may seek LEED, Living Building, or similar certification, including energy efficient design and native habitat oriented site development. The preliminary site plan is designed to provide access from the existing beach pavilion parking lot to elevated boardwalks that traverse approximately 1 acre of outdoor interpretive exhibits proposed on previously developed parking area that is outside the dune enhancement action area and Alabama beach mouse critical habitat area. The area encompassed by the boardwalks would be developed as a dune exhibit with the creation of a secondary dune habitat conducted as part of the interpretive center construction. Dune creation in this area would include placement of sand mounds, installation of sand fences, and extensive planting of native species typical of the secondary dune environment.

11.7.3.3 Research and Education Facility

The proposed construction of a research and education facility would include construction of a research and education facility with classrooms, laboratories, and overnight and dining facilities for approximately 50 students proposed. The location and layout of this proposed facility is shown in Figure 11-15. This facility, which would accommodate students and their supervisors, would be located next to the existing nature center in an area that is currently maintained as lawn. The research and education center would be used to support a year-round program of K-12 environmental education focused on improving scientific understanding of Alabama's Gulf coast ecosystems. Construction staging for the research and education center is expected to occur on mowed lawn or existing parking area and would not involve disturbance to natural habitat. The research and education facility would be a pile-supported wood frame structure similar to the adjacent nature center and would incorporate sustainable design features and may seek LEED, Living Building, or similar certification.

11.7.3.4 Trails and Amenities

To facilitate access to the environment and connect park visitors to the natural resources, the following amenities would be constructed:

- approximately 13 miles of new and enhanced recreational trails and boardwalks throughout the park for walkers, runners, cyclists, and other users including approximately 9.5 miles of new trails and approximately 3.5 miles of enhancement to existing trails;
- trail enhancements may also include, but would not be limited to, overlooks, interpretive kiosks and signage, rest areas, bike racks, and/or bird watching blinds; and
- additional lake amenities such as fishing piers, paddle-under bridges, and paddle craft launch points. The lake amenities would include three short finger piers and two bridged walkways into and over Lake Shelby and its spillway. Approximately 1,140 feet and 0.25 acre of piers and bridges would extend into and over Lake Shelby.

Figure 11-16 shows the location of the trails. The trails have been field-located by park staff and have been aligned to avoid impact to existing vegetation. Approximately 3.5 miles of these trails follow existing footpaths, and construction of the trail enhancements would occur in these already disturbed areas or in utility corridors. Typical trails in upland areas would be constructed of either gravel or asphalt pavement (see Figure 11-17 for a cross section of a typical upland trail). Trail alignments through wetland areas have been adjusted to avoid trees in forested wetland areas and to avoid SAV where open water crossing is proposed. A cross section of a typical wetland crossing is shown in Figure 11-18. Tree removal is not anticipated but may occur where a trail alignment must be adjusted if cultural resources are discovered during the ongoing cultural resource survey.

Where boardwalks occur, boardwalk bases would be driven into the ground; however, there would be a minimum of approximately 5 feet between the base of the boardwalk and the wetland surfaces so that emergent plants are not stunted. There would be a minimum of 0.75 inch between boardwalk slats to allow sufficient sunlight to reach wetland plants beneath the boardwalk.

Figure 11-13. Dune enhancement action area.

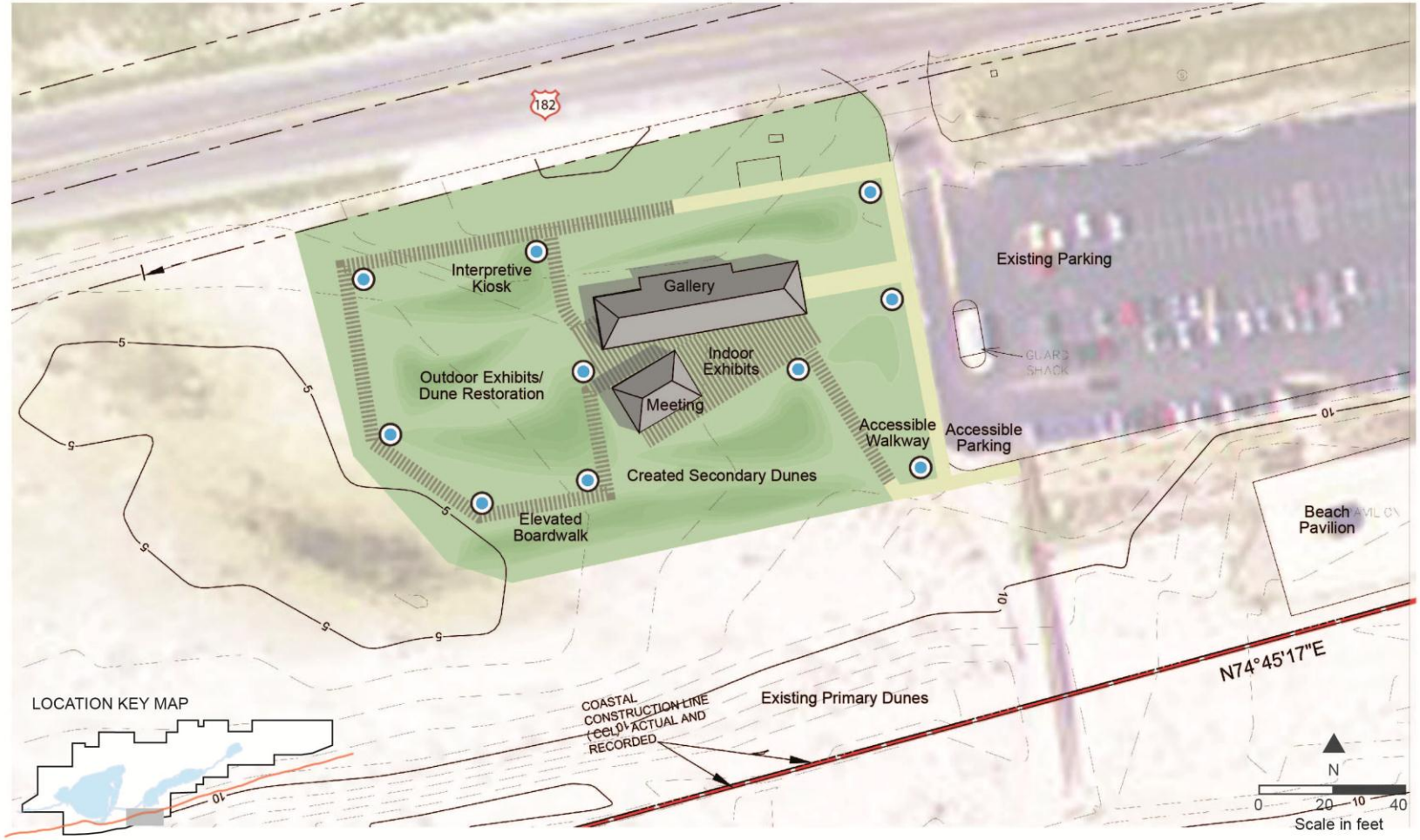
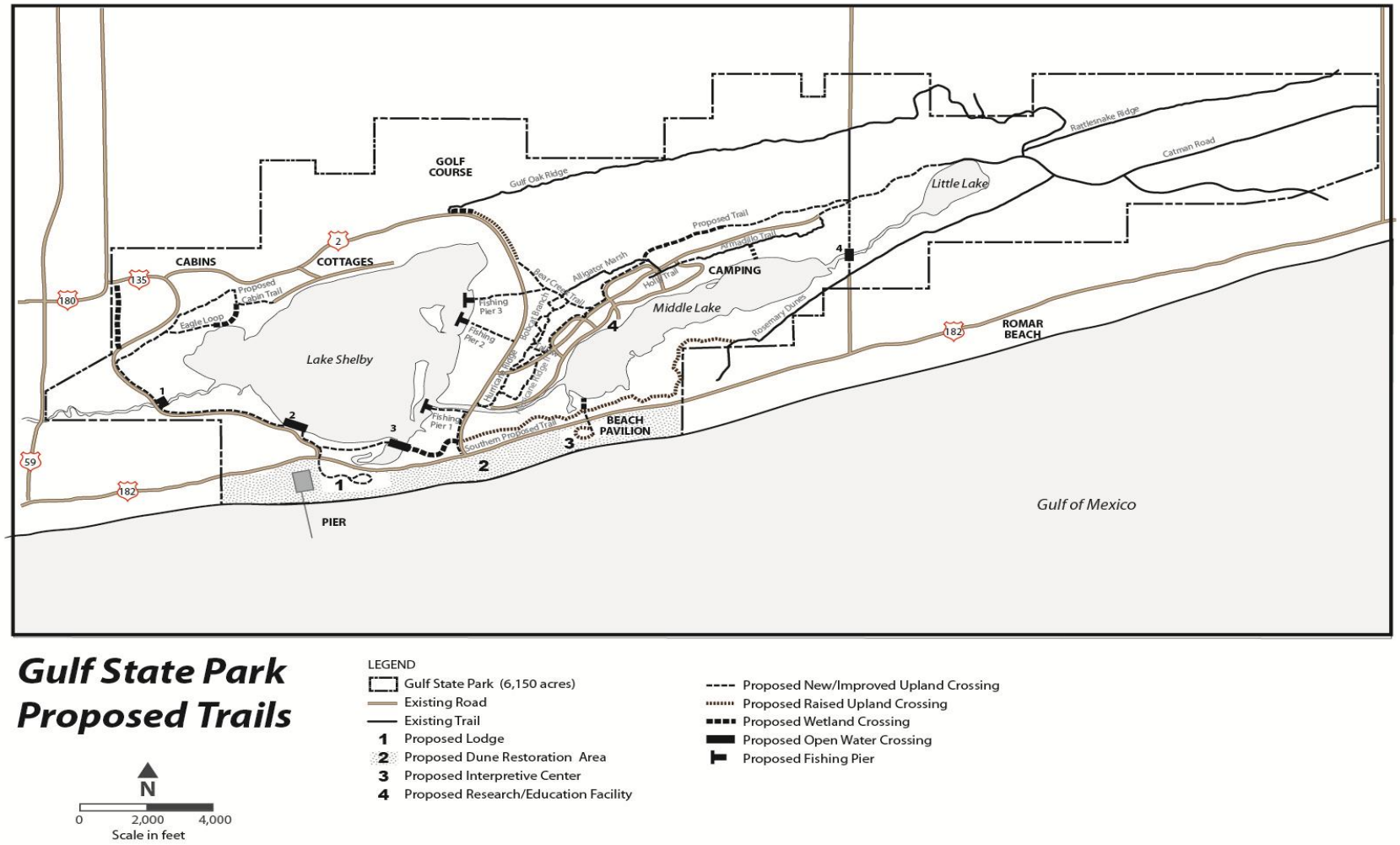


Figure 11-14. Gulf State Park Interpretive Center preliminary design – conceptual site plan.

Figure 11-15. Gulf State Park Research and Education facility location.



Gulf State Park Proposed Trails

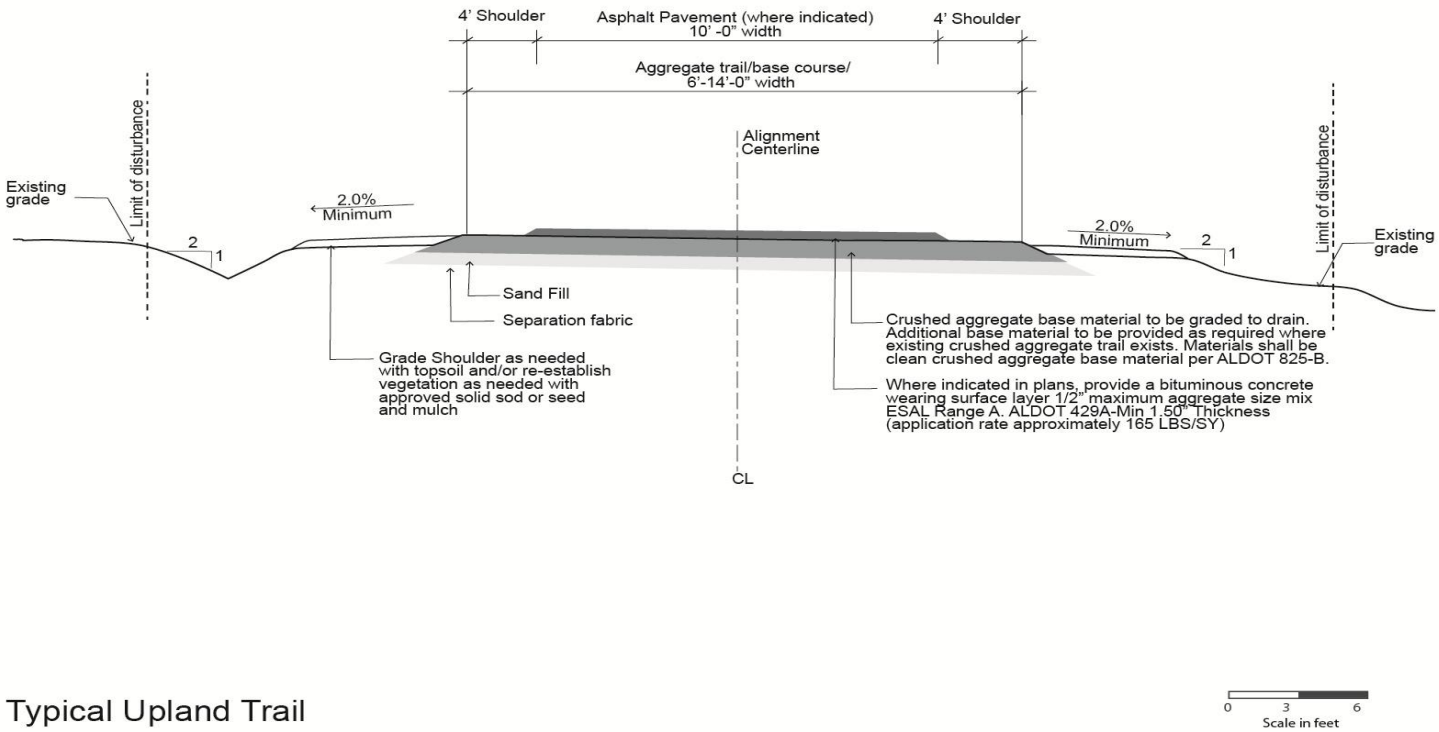
N

0 2,000 4,000
Scale in feet

LEGEND

- Gulf State Park (6,150 acres)
- Existing Road
- Existing Trail
- 1 Proposed Lodge
- 2 Proposed Dune Restoration Area
- 3 Proposed Interpretive Center
- 4 Proposed Research/Education Facility
- Proposed New/Improved Upland Crossing
- Proposed Raised Upland Crossing
- Proposed Wetland Crossing
- Proposed Open Water Crossing
- Proposed Fishing Pier

Figure 11-16. Trail locations.



Typical Upland Trail

Figure 11-17. Trail cross section – typical upland trail.

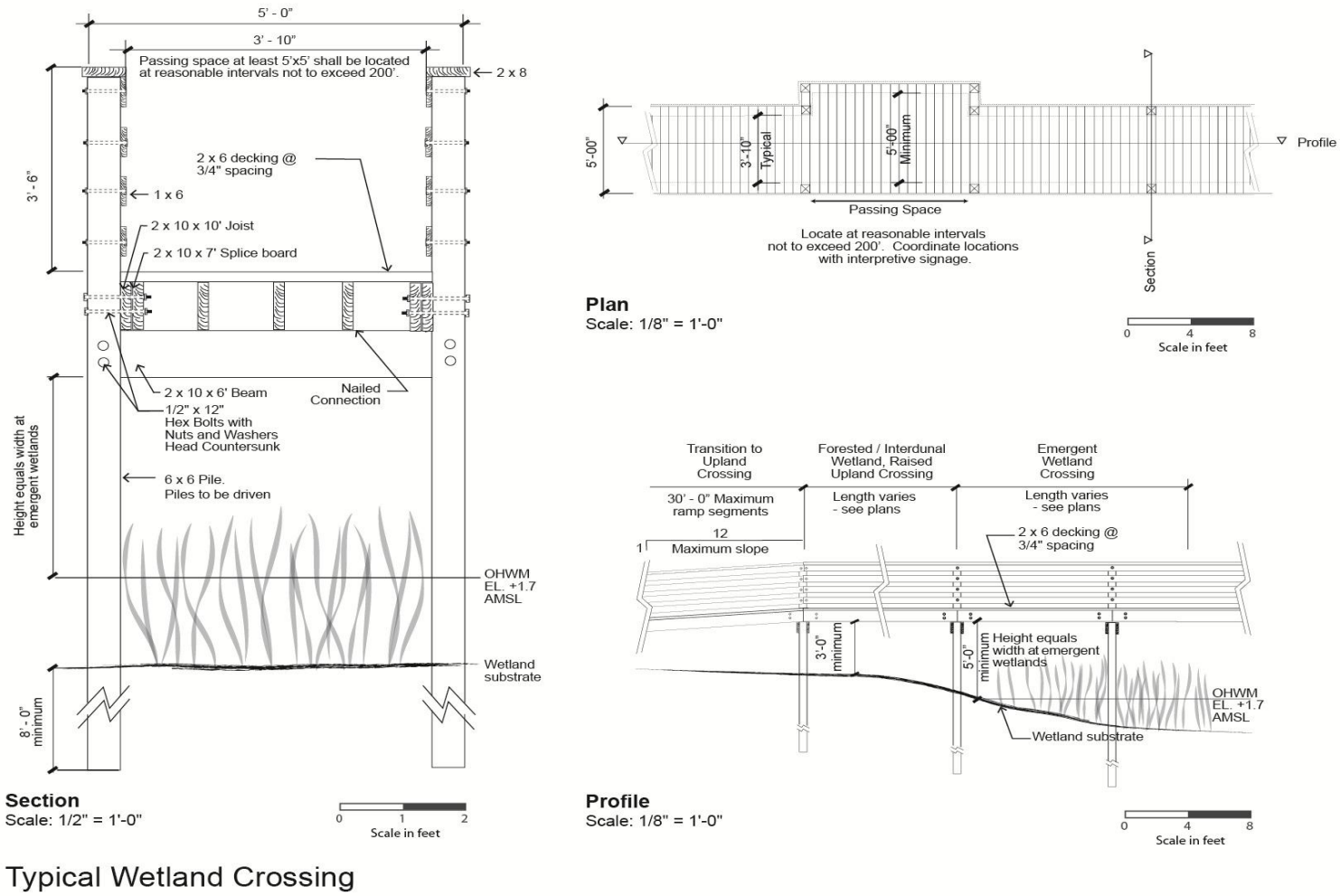


Figure 11-18. Trail cross section – typical wetland trail crossing.

After construction, areas adjacent to the trails that have been disturbed would be re-graded and monitored, and native vegetation would be re-established as needed. Siting of the trails would avoid Alabama beach mouse habitat and include elevated walkways over wetlands to avoid wetland fill.

11.7.3.5 Dune Enhancement

Dune enhancement activities would take place on approximately 50 acres within a 145-acre restoration action area south of SR 182 as shown in Figure 11-13. This would include the creation of sand movement corridors at strategic locations within the manmade dunes. The dune restoration area, including sand movement corridors, is within Alabama beach mouse critical habitat and would be conducted according to the existing Habitat Conservation Plan. The area landward of the restored primary dune band is predominantly flat with limited development of secondary dunes. Sea Oats (*Uniola paniculata*) predominate in this area. Enhancement activities are expected to be restricted to the placement of sand fencing to promote sand accretion and planting of native dune grasses and other Alabama beach mouse food and shelter species to increase the biodiversity and habitat value of the secondary dune field. Light vehicles such as pick-up trucks or all-terrain vehicles (ATVs) would be used to deliver materials to locations along SR 182 near enhancement sites with access to the dune field restricted to walk-in. Volunteers under the supervision of park staff would conduct enhancement activities.

11.7.4 Operations and Maintenance

Operational details for each project element are described as follows.

Re-establishment of Gulf State Park Lodge and Conference Center: Lodge operations and maintenance (O&M) would include the implementation of the Habitat Conservation Plan (including management measures related to lighting, pets, and other operational aspects that could impact species). In addition, O&M would integrate Best Management Practices for "Green Lodging." Certification may be sought through a recognized green lodging program, which would be attractive to meeting planners seeking "green" alternatives. Consistent with these programs, the lodging O&M operational plans would address goals and objectives in six key areas—communications, waste reduction, water conservation, energy efficiency, indoor air quality and vehicle maintenance. Goals for each of these are discussed below with examples of specific measures that will be evaluated as plans for lodge design and operation are finalized.

- **Communications:** The communication component of the plan would clearly relay to guests, employees, suppliers, and contractors the lodge's commitment to environmental protection through policies, training, and educational elements detailing adopted practices such as timely and pertinent training programs, media such as guest-room placards, hotel TV video and signage identifying environmental programs, information about environmental initiatives in marketing and advertising materials, and routine discussion of environmental practices at staff events including all levels of employees to achieve buy-in. Education practices may also include tours highlighting the facility's environmental initiatives offered as part of the park's environmental education program, identification of eco-tourism offerings in the region integrated into the lodge's programming, and informational materials that would be accessible to park visitors as well as guests and linked to interpretive trails through the site. On-going review of practices to

assess effectiveness would be conducted to ensure environmental performance is continually updated.

- **Waste Reduction:** A written waste reduction plan and recycling program tailored to the lodge and meeting facility's procedures and structural design would be developed to address waste reduction. The plan would include best practices for reducing waste generation, treatment and disposal, and methods for tracking waste issues on a regular basis to allow updating of procedures. Procedures would include safe storage and disposal of hazardous materials such as paint, oils, chemicals, pool supplies, spent light bulbs, and, where feasible, traditional hazardous chemicals could be replaced by safer green alternatives such as green cleaning and pool supplies. Environmentally-friendly purchasing policies would address reduction of sources of waste using strategies such as purchasing in bulk, controlling excess inventory and supplier take-back, as well as selecting environmentally-preferable options for consumables such as table linens, dishes, toiletries, newspapers and informational materials with recycled content, supplied on-request only, or made of durable, reusable and non-disposable or biodegradable material. A recycling program would be an integral part of the waste reduction program. It would include all commonly recycled materials and places for easy-to-use containers designed into the lodge and conference center. Storm damage is a special consideration in an ocean-front site and would receive careful attention during design to minimize finishes that would be damaged or torn free during a storm event to lessen post-storm debris. The interior finish plan would be developed during design and would focus on the reduction of finishes that could be ruined during storm events to reduce the potential for mold and mildew development that require finishes to be replaced.
- **Water Conservation**: A water conservation plan addressing both operational water use and guest water use would be developed in pre-design to ensure appropriate fixture selection and facility design with specific features determined during design. The water conservation plan would include water usage and sewerage tracking to detect issues as they arise so that leaks or other unusual variations can be addressed, and landscape water use elimination using native species and rain gardens. Specific practices may include optional towel and linen replacement in guest rooms to reduce laundry water use, sweeping of patios, walkways and floors to reduce the need for spraying and mopping, use of low-flow faucets and nozzles, recycling of rinse water, and kitchen policies that eliminate running water for tasks such as thawing frozen foods. A commissioning plan would be included in the design of the facility to address systems commissioning to ensure efficient operation of all equipment and would include a preventative maintenance program. Water efficient equipment would be evaluated for inclusion in the facility design such as Energy Star rated ice machines, hot water heaters, dishwashers, boilers, and chillers.
- **Energy Efficiency**: Similar to water efficiency measures, energy efficiency would be integrated into the design of the facility starting during pre-design. Energy tracking would be used to maintain efficiency and address issues as they arise. Specific features may include the use of passive energy conservation design choices such as proper orientation and shading of buildings, the use of energy efficient windows, doors, insulated wall materials, high-efficiency HVAC systems and ceiling fans, occupancy sensors and lighting control systems, white or reflective

roofing and walls, the use of natural light wherever possible, and an energy management system. High efficiency lamps such as LED or T8 with electronic ballasts would be used in coordination with turtle-safe lighting practices. Wildlife-safe lighting, described in the Habitat Conservation Plan calls for low light levels that would also result in energy savings. A commissioning plan would be included in the design of the facility to address systems commissioning to ensure efficient operation of all equipment and would include a preventative maintenance program. Energy efficient equipment would be evaluated for inclusion in the facility design such as Energy Star rated in-room appliances and programmable thermostats.

- **Indoor air quality**: Indoor air quality would be addressed during pre-design to ensure an integrated approach to controlling mold, mildew, and other indoor pollutants. Mold and mildew are especially important considerations in an ocean-front facility. In addition to efficient HVAC that maintains proper indoor humidity, preventive maintenance to detect and address leaks, condensation, and wet spots, and finishes selected to reduce hazardous compounds and to eliminate risk of mold and mildew would be evaluated.
- **Vehicle Use and Maintenance**: Operation of the re-established lodge would include daily personal vehicle use by those staying at the lodge, attending meetings at the lodge, and visiting the lodge to experience interpretive programs as well as employees commuting to the lodge. Other vehicle use would include commercial vehicles coming to the lodge to deliver goods and provide services, such as maintenance. Use of vehicles by park staff is not expected to increase. Any park vehicles utilized in conjunction with O&M would be maintained at the current park headquarters and at the golf course. Vehicle maintenance would not occur at the site of the re-established lodge.

Interpretive Center: The interpretive center would be open and operational during hours set by Gulf State Park. The facility would be minimally staffed, and visitors would utilize the existing parking lot for the adjacent pavilion facility. Regular building maintenance would occur to ensure all systems are running efficiently and kept operational.

Education and Research Center: The education and research center would be open and operational to accommodate specific events, such as school groups or researchers on a year-round basis. These users would share the parking of the existing nature center. Other amenities in the area related to the campground (such as the pool) would be available for use. Regular building maintenance would occur to ensure all systems are running efficiently and kept operational.

Trails: Because the new and enhanced trails are part of an existing trail system, maintenance would occur in conjunction with the existing trails, following park standard operating procedures.

Dune Enhancement: The dune enhancement element would include a two-year monitoring plan discussed in detail below. Outside of this monitoring and any actions that may occur under monitoring if plant survival is low, no additional maintenance would occur.

Monitoring for all Project Elements: Performance of the five proposed project elements would be monitored. Monitoring would address the project's success in promoting recreational use,

environmental education initiatives, and ecological performance of the dune restoration and enhancement efforts.

The lodge and conference center are designed to promote public access to Alabama's coastal natural resources. To document the recovery of lost recreational use, park authorities will provide annual information on the total number of visitors to the rebuilt lodge, lodge occupancy rates, average length of stay, and the state of origin for visitors. Information regarding the number of visitors attending meetings at the facility also will be provided.

The new interpretive center, research and education facility, and trails are also expected to enhance the experiences of existing visitors and attract new visitors to the park. As a broad measure of the impact on visitation of park enhancements, park managers would continue to assemble data on the total number of visitors to the park each year. This information has been collected extending back as far as the early 1990s and will provide a basis for long-term comparisons of park visitation, including comparisons to the time when the previous Gulf State Park Lodge was operating. In addition, GSP park managers would provide a description of the interpretive, educational, and research programs conducted and monitor participation in these programs and provide annual summaries. Data would include the number of participants by program and the length of the programs attended.

Ecological performance monitoring is necessary for two aspects of the proposed project. First, the dune restoration work would involve planting to stabilize dunes in the park. A monitoring plan would be implemented to ensure establishment and survival of transplanted species. The growth and extent of coverage by transplants would be documented, and, if required, replanting would occur. Replanting would occur if species survival of the original planted stock falls below 75 percent. Photographic documentation would be available for the newly stabilized areas. Also, sand fencing would be monitored, maintained, repaired, and replaced as necessary over the monitoring period. The duration of the monitoring plan would be established as a condition to the permit and through agency coordination.

Second, construction of the lodge would require wetlands mitigation. Approximately 0.228 acre of emergent wetlands would be created on-site to offset a 0.076-acre area of impacts. A multi-year monitoring plan would be implemented at the newly created wetland. This would include quarterly monitoring during the first year after construction and semi-annual monitoring for the next four years. Monitoring would document surface and subsurface water depths, vegetation growth and coverage, invasive species coverage and removal efforts, and wildlife observed in the wetland. Photographs of the site would also be provided after each monitoring event.

There would also be extensive monitoring during dune restoration and throughout the construction activities for the trails, lodge, and the research and education and interpretive facilities. This would ensure that all these activities comply with the full set of environmental permit conditions, including conditions relating to endangered species like the Alabama beach mouse. Specific construction monitoring requirements would be defined in conjunction with the final permits for work at the site.

11.7.5 No Action

Both OPA and NEPA require consideration of the No Action alternative. For this Draft Phase III ERP proposed project, the No Action alternative assumes that the Trustees would not pursue the Gulf State Park Enhancement Project as part of Phase III Early Restoration.

Under No Action, the existing conditions described in Chapter 3 would prevail. Restoration benefits associated with this project would not be achieved at this time.

11.7.6 Affected Environment and Environmental Consequences

11.7.6.1 Physical Environment

11.7.6.1.1 Geology and Substrates

Geology

Affected Resources

Both the northern and southern portions of GSP are located entirely within the Coastal Lowlands district of the East Coast Gulf Coastal Plain section of the Coastal plain physiographic province (Geological Survey of Alabama, 2006; Neilson, 2007). The Coastal Lowlands district developed on sand and mud and has been modified over the last 10,000 years by coastal processes, such as tides, wave activity, wind, and currents. GSP is underlain by Holocene-aged, alluvial sand deposited by wave activity, longshore drift, and erosion of sandy parent material (Schmid and Otvos, 2010). Holocene deposits in the park consist mainly of sandy material with areas of finer material, such as silt and clay, and marshy areas mainly composed of organic material. North of SR 182, where the proposed recreation trails and research and education facility would be located, geologic resources are composed primarily of flat, gently sloping surfaces. Remnant dunes trending southwest to northeast are located in the southeastern portion of the park. Three predominantly fresh water, spring-fed coastal lakes are present in the northern portion of GSP; these lakes are unique because they are of a type limited to Alabama and the Florida panhandle. The remainder of the northern parcel of GSP is dominated by depressional areas that consist of relic and recent tidal marshes, lowland flats where freshwater wetlands dominate, and upland flats dominated by maritime forests.

South of SR 182, where the re-established Gulf State Park Lodge and Conference Center, dune enhancement, and interpretive center elements of the proposed project would be located, geologic formations consist mainly of a wet beach and a dune system. The wet beach consists mainly of well-sorted coarse and fine sand and is mostly unvegetated. Beyond the wet beach is an extensive dune system, consisting of primary and secondary dunes, interdunal swales, and scrub dunes.

Primary dunes are located closest to the wet beach, and extend north approximately 25 feet (Volkert, 2003). Primary dunes are highly susceptible to erosion from human activity, primarily from people walking on them and destroying the vegetation that holds them in place. Hurricane Frederic destroyed GSP's primary dunes in 1979. Although the dunes have been rebuilding, this process has been slowed by the impacts from storms throughout the years, including the extremely strong Hurricane Ivan in 2004. At this time, there are approximately 145 acres of dune habitat in GSP. This habitat includes primary dunes,

secondary dunes and interdunal swale and scrub dune habitat; however, the acreage fluctuates given the dynamic nature of the system.

Secondary dunes are located behind the primary dunes. They have similar characteristics as primary dunes, but are often lower in elevation. Secondary dunes are susceptible to the same activities as primary dunes; however, the presence of primary dunes somewhat protects secondary dunes from natural erosive activities such as storm surges. Human impacts are still as detrimental to secondary dunes as they are to primary dunes.

Interdunal swales are the areas between the secondary dunes and scrub dunes. They are mostly low-lying, unvegetated areas. The scrub dunes, located farthest north from the Gulf, are not as susceptible to natural events as primary and secondary dunes. However, they are as susceptible to human impacts.

Environmental Consequences

Construction

Gulf State Park Lodge and Conference Center and Interpretive Center. The proposed re-establishment of the Gulf State Park Lodge and Conference Center on an approximately 10 acre site and the approximately 0.1-acre interpretive center would be sited between existing dunes south of SR 182. Project design would ensure that impacts to existing dunes are minimized. During construction, BMPs to minimize erosion would include cordoning the area with silt fencing and wetting the area to minimize dust. These practices would minimize soil loss; however, they would also temporarily restrict sand movement, which would impact dune formation. Construction of the lodge and interpretive center would temporarily impact dune formation, but would not change the overall local geologic features. With implementation of BMPs, impacts from construction would be adverse, but short-term and minor because impacts would be small and localized. There would not be any permanent changes to geological features at the sites.

Research and Education Facility and Trails. The proposed research and education facility and recreation trails are not located near sensitive geological areas. Construction of these proposed projects would disturb soil (discussed below), but not geologic resources. Consequently, construction of the approximately 9.5 miles of new recreation trails, enhancement of approximately 3.5 miles of existing trails, and the research and education facility (less than an acre of disturbance) would have no anticipated effects on sensitive geological areas because there are no sensitive geologic resources present in the proposed project area.

Dune Habitat Enhancement and Restoration. Light construction equipment, such as ATVs or small pick-up trucks, would be used to transport vegetation that would be transplanted in the dune systems over the project area. Some sand movement corridors may be established through the existing man-made berm by earth-moving equipment as part of the restoration process; however, care would be taken to ensure that only prescribed corridors be established and that the equipment would not recklessly traverse the dunes. Further, selection of locations for sand movement corridors would be based on several factors including existing breaks and established vegetation. This selection would also include coordination with USFWS immediately prior to work commencing. Because sand movement corridors

may be created in small areas of the existing man-made berm during the construction phase, anticipated impacts from the construction phase of the proposed dune restoration and enhancement project would be adverse, but short-term and minor because impacts would be small and localized and would not result in any permanent adverse changes to geological features at the sites.

Operation

Gulf State Park Lodge and Conference Center and Interpretive Center. The re-established Gulf State Park Lodge and Conference Center would be designed to be sensitive of the surrounding environment, recognize the potential effects on dune replenishment, and include an unobstructed lower level that would allow for the natural movement of sand through the approximately 10-acre project footprint. Additionally, elevated pathways from the lodge to the beach would be constructed over dunes so that visitors can access the beach without walking on the dunes. Placing such structures in the path of moving sands and winds would have minimal effects on the accretion rates of dune systems; the proposed building designs would further minimize these impacts by raising the buildings on piles to allow sand and wind to travel beneath the buildings.

The proposed interpretive center would be located adjacent to the existing beach pavilion and its associated parking lot. Similar to the lodge, the interpretive center would be elevated above the beach so that the natural movement of sand and wind would be minimally.

Both buildings would be designed to be elevated to minimize interference with the movement of sand; however, there may be small and localized impacts. These impacts would not result in permanent changes to local geologic features and would be adverse but short-term and minor.

Dune Restoration and Enhancement. Actions undertaken as part of the proposed dune restoration and enhancement would be designed to restore or enhance approximately 50 acres of dune habitat within GSP, adjacent to Gulf State Park Lodge and Conference Center site. This project element includes replanting dune-stabilizing plants to allow for sand accretion, the establishment of sand movement corridors within the man-made berm in strategic locations to allow better sand movement to promote secondary dune development, and installation of sand fencing to promote new dune development. As part of these efforts, visitors would be educated about the importance of dune ecology and how to avoid damaging the dunes. Measures would be taken to allow visits to the dune habitat, but would prevent walking on the dunes. By restoring such a large area of dunes, this element of the proposed project could provide substantial increases in natural protection from strong storms and hurricanes.

Impacts from the dune restoration and enhancement project would be long term and beneficial because the enhancement of approximately 50-acres of dunes would be a positive, readily apparent change to local geologic characteristics.

Research and Education Facility and Trails. Operation and use of the approximately 13 miles of proposed new and enhanced trails and the proposed research and education facility would have no anticipated effects on sensitive geological areas because they would not be placed in geologically sensitive areas.

Soils

Affected Resources

The digitized Baldwin County Soil Survey (USDA NRCS, 2006) identifies 13 different soil map units within GSP. Of these 13, only 5 intersect with any one or combination of the elements associated with the proposed project. Table 11-6 describes the soil map units intersected by the proposed project elements. More complete descriptions of the soils intersected by the proposed project elements are below. Electronic soil data are only as accurate as the original soil survey from which they were digitized. Changes to soils since the original publication date are not reflected in the electronic data; therefore, reported soil map units may be different than what actually exists in present time. For example, the Baldwin County Soil Survey was originally published in 1964 (USDA - SCS, 1964) and its authors surveyed many acres of tidal marsh soils. At the time of its original publication, there may have been tidal marsh soils present; however, soils are dynamic, and any number of effects on soil formation factors can cause changes in their properties. Although no formal verification of the soil surveys was performed, tidal marshes were not observed during informal site visits; therefore, it is unlikely that active tidal marsh soils currently are present in the project locations identified on the soil survey maps.

Table 11-6. Soil units within proposed project areas.

SOIL UNIT CODE	MAP UNIT NAME	INTERSECTED BY PROPOSED PROJECT	HYDRIC SOIL	PRIME FARMLAND
Co	Coastal Beaches	Gulf State Park Lodge and Conference Center; Interpretive Center; Recreation Trail; Dune Restoration and enhancement	Yes	No
LkB	Lakewood sand, 0-5% slopes	Recreation Trail	Yes	No
Ls	Leon Sand	Recreation Trail	Yes	No
SsB	St. Lucie sand, 0-5% slopes	Recreation Trail	Yes	No
Td	Tidal marsh*	Recreation Trail	Yes	No
* As stated above, it is unlikely that Tidal marsh soils are currently present to the extent mapped in the Baldwin County Soil Survey. Source: USDA NRCS, 2006.				

The majority of the soils in GSP are characterized as being formed from sandy marine deposits derived from sedimentary rock. The sands were carried to their location either from Gulf tidal surges, storm activity, or prehistoric riverine transport. Sands do not provide a stable substrate for building trails and buildings; the natural properties make most of the soil in GSP unsuitable for supporting trails and buildings; however, applying engineering BMPs can make the soils more appropriate for construction/development.

Currently, concerns regarding existing conditions of soils include the creation of approximately 11,000 feet of impromptu foot paths by visitors near the campgrounds north of Middle Lake. This area does not have many existing trails, and visitors are walking through the campgrounds on areas where trails do not currently exist, which creates new, informal trails. This activity denudes the area, allowing soil to erode and move out of place during precipitation events.

Coastal Beaches. This map unit contains the Newhan soil series and beach sand. Within the park, this map unit is located south of SR 182. These soils exist on beach ridges and beaches and were formed from wind- and water-deposited sands of sedimentary origin. Depending on where they are located in the landscape, soils in this map unit can be either excessively well-drained or poorly drained and may be rarely to frequently flooded. The components located along beach ridges are less subject to flooding and have a faster drainage class. Because these soils are very sandy and may be subject to flooding, they are very limited in their ability to support buildings and trails without applying engineering BMPs.

Lakewood Sand, 0 – 5 percent slopes. This map unit is composed primarily of soils from the Lakewood and Kershaw soil series. Within GSP, they are located north of SR 182 within upland areas. These soils exist mostly on hill slopes and were formed from sandy marine deposits derived from sedimentary rock. The soils in this map unit are mostly excessively well-drained--with small pockets of poorly drained soils-- and have no frequency of flooding or ponding except in the minor, poorly drained components. These soils are suitable for constructing small buildings; however, their sandy nature limits their ability to support trails without applying engineering BMPs.

Leon Sand. This map unit is composed mostly of soils from the Leon soil series, some of which are hydric. Within the park, they are located north of SR 182, extending west to east, north of the three lakes. These soils exist mostly in depressions and were formed from sandy marine deposits derived from sedimentary rock. The soils in this map unit are mostly poorly to very poorly drained, and may be prone to frequent ponding. The possibility of ponding makes soils in this map unit very limited to accommodate buildings without applying engineering BMPs and their sandy nature limits their ability to support recreation trails without applying engineering BMPs.

St. Lucie Sand, 0 – 5 percent slopes. This map unit is composed mostly of soils from the St. Lucie soil series. Within GSP, they are located north of SR 182, in the flats interspersed with the LkB and Ls soil map units. These soils exist mostly in the flats of toe slopes and were formed from sandy marine deposits derived from sedimentary rock. The soils in this map unit are mostly excessively drained with practically no frequency of flooding and ponding. Similar to the LkB soil map unit, these soils are suitable for constructing small buildings; however, their sandy nature limits their ability to support trails without applying engineering BMPs.

Tidal Marsh. This map unit is composed mostly of soils from the Lafitte and Axis soil series within GSP. They are located north of SR 182 and almost entirely around the areas adjacent to and in between the three lakes. These soils exist mostly in tidal flats and are composed primarily of herbaceous detritus and loamy marine material over sedimentary deposits. The soils in this map unit are very poorly drained and are prone to frequent ponding and flooding; therefore, they are very limited in their ability to support buildings and trails without applying engineering BMPs.

The description of the tidal marsh soils indicates they are formed partially as a result of tidal activity. However, as discussed under Hydrology and Water Quality, there is very little tidal influence on the soils north of SR 182. Construction of a weir in 1991, which cut off the lakes from daily tidal surges, essentially prevented these terrestrial areas from receiving tidal water and sediment. Therefore, these areas mapped as tidal marsh soils have likely undergone a transition that represents a more freshwater-

dominated hydrology. Although they are still likely prone to frequent ponding, they likely experience less flooding from tidal surges; however, they may still experience some flooding during storms when tides cause sea water to move across SR 182.

Prime Farmland and Farmland of Statewide Importance

Prime farmland and farmland of statewide importance are special categories of highly productive cropland that is recognized and described by the Natural Resources Conservation Service (NRCS). Prime farmland is land that has the best combination of physical and chemical characteristics for producing crops. Soils that do not meet the prime farmland category but are still recognized for their productivity by states may qualify as farmland of statewide importance. In either case, cropping practices such as irrigation or drainage may be required for the soil to meet its production potential.

Only one soil map unit within GSP, LyA, Lynchburg fine sandy loam, 0-2 percent slopes, is considered prime farmland or soil of statewide importance. However, this map unit is only found in the northwest corner of GSP and is located outside the area where the proposed project elements would be sited. The remaining soils within GSP are not rated as prime farmland or soil of statewide importance.

Hydric Soil

Hydric soils are defined by the National Technical Committee for Hydric Soils as soils that form under conditions of saturation, flooding, or ponding long enough during the growing season to develop anaerobic conditions in the upper part. These conditions can produce organic hydric soils composed of muck and/or peat or mineral hydric soils. Mineral hydric soils manifest various redoximorphic features including grey soils and deposits of iron or manganese (USDA NRCS, 1994). All of the soil map units identified in GSP are classified as hydric soils. Either the dominant or minor soils, or both, are classified as hydric, thus making the map units hydric.

Environmental Consequences

Construction

All Project Elements. All of the elements associated with the proposed project would require moving soil, either on a large scale for re-establishing the Gulf State Park Lodge and Conference Center (approximately 10 acres for the building footprint) or a small scale for the Interpretive Center (approximately 0.1 acre). Any time soil is disturbed, there is an increased potential for erosion if the displaced soil is not properly secured using BMPs. Environmental permitting for these projects would require E&S plans to obtain building permits from the municipality. E&S plans ensure that erosion and sedimentation are minimized by using BMPs. Typical examples of BMPs include:

- Cordoning off the work area with silt fences.
- Covering piles of removed soil with sod to keep it in place.
- Salvaging and reusing topsoil either in place or in other project areas.
- Revegetating the area so that the area of bare soil remaining after construction is eliminated.

Because E&S BMPs would be used during all aspects of construction and rehabilitation, impacts would be small and localized, and soil characteristics at project sites would not change. Therefore, it is anticipated that impacts to soil would be adverse but short-term and minor.

Operation

All Project Elements. After construction and final grading is completed at all project sites, bare soils would be revegetated to prevent erosion. None of the proposed project elements would have adverse effects on soil resources during operation because they include no ground-disturbing activities. The proposed recreation trails would be located, in part, north of the existing campground and north of Middle Lake. Their design includes regrading the shoulder of the trails with topsoil and reestablishing native vegetation with sod or seed and mulch so that runoff off of the trails does not create erosion along the sides of the trails. Thus, the proposed new paved and formalized recreation trails, once constructed, would discourage visitors from walking on the approximately 11,000 feet of existing dirt paths, which would provide an opportunity for dirt paths to be revegetated and reduce soil erosion along the existing paths created by visitors. Therefore, operation of the proposed project would have long-term, beneficial impacts on soil resources.

11.7.6.2 Hydrology and Water Quality

Wetlands

Affected Resources

In GSP, wetlands are located both south and north of SR 182. In 2003, approximately 1.1 acres of wetlands were identified south of SR 182 within the vicinity of the former and present Gulf State Park Lodge and Conference Center location (Volkert, 2003). These wetlands were clustered east and west of the road to the state pier, and they consist of wet swales currently containing predominantly salt meadow cord grass (*Spartina patens)* and cogon grass (*Imperata cylindrica).*

Figure 11-19 shows wetlands in the park. After Hurricane Ivan in 2004, a portion of the previously delineated wetlands was destroyed by flooding. A wetland delineation to support the current proposed activity was performed, and only 0.18 acres of wetlands were identified within the proposed site for the re-established Gulf State Park Lodge and Conference Center with 0.076 acres of permitted fill. A subsequent request for a preliminary jurisdictional determination (PJD) of surveyed wetlands was submitted to the U.S. Army Corps of Engineers (USACE) on May 29, 2013. In a letter dated June 24, 2013, the USACE approved the jurisdictional determination of wetlands (File Number: SAM-2013-00673-JEB).

North of SR 182, where the proposed research and education facility and trails are located, the majority of the park is dominated by different wetland systems. Wetlands in this area of the park were surveyed in 2013. The wetland assessment was coordinated with the Mobile District USACE for construction of the elevated walkways over wetlands and for structures in Lake Shelby and Middle Lake. The USACE indicated that the proposed activities would fit the General Permit for the construction of Piers, Wharves, and their Normal Appurtenances such as Stairways and Walkways (ALG05-2011). Table 11-7 identifies the acres of different wetland types intersected by the proposed projects .

Table 11-7. Wetlands Intersected by Proposed Projects in Gulf State Park.

COWARDIN CLASS	DESCRIPTION	INTERSECTED BY PROPOSED PROJECT	ACRES
E1UBL	Estuarine Unconsolidated Bottom	Recreation Trail	0.4 (Bridged)
E2EM	Estuarine Emergent	Recreation Trail	1.4 (Bridged)
E2SS	Estuarine Scrub-shrub	Recreation Trail	0.1 (Bridged)
PEM	Palustrine Emergent	Gulf State Park Lodge and Conference Center	0.076 (Fill)
PFO	Palustrine Forested	Recreation Trail	5.5 (Bridged)
PSS	Palustrine Scrub-shrub	Recreation Trail	0.1 (Bridged)
	Total	**7.6**	
Source: USFWS, 2010.			

The majority of the wetlands in GSP are freshwater wetlands; however, in the southwestern portion of the park, the wetlands are classified as estuarine and have a brackish hydrology. A weir was placed in the channel that connects Lake Shelby to Little Lagoon in 1991 in order to maintain Lake Shelby as a primarily fresh water resource. The weir is intended to allow lake water to flow into the lagoon and to prevent reverse flow from the lagoon; however, during extreme high tides, brackish water from Little Lagoon backflows through the channel to create estuarine wetlands. Additionally, occasional storm surges cause Gulf water to enter Lake Shelby and its adjacent wetlands, thus contributing to the estuarine hydrology.

The remaining wetlands in GSP are dominated by palustrine forested, palustrine scrub-shrub, and palustrine emergent wetlands with a few areas of palustrine aquatic bed and palustrine unconsolidated bottom wetlands.

Environmental Consequences

Construction

Gulf State Park Lodge and Conference Center. Within the vicinity of the proposed Gulf State Park Lodge and Conference Center, 0.81 acre of wetlands were surveyed, for which the USACE issued a PJD (File Number: SAM-2013-00673-JEB). Construction and operation of the re-established lodge would involve filling 0.076 acre of palustrine emergent wetlands (see Figure 11-19). Filling activities require a Nationwide Section 18 permit from the USACE and a Water Quality Certification from ADEM to satisfy Sections 404 and 401, respectively, of the Clean Water Act (CWA). To mitigate for the wetlands that would be filled, GSP would create 0.22 acre of replacement wetlands within the footprint of the proposed lodge and conference center. Although a portion of one wetland would be destroyed to accommodate lodge construction, it would be replaced at a 3:1 ratio; thus wetland area, functions, and values would increase as a result of construction of Gulf State Park Lodge and Conference Center. A Wetland Rapid Assessment Procedure (WRAP) was prepared to evaluate the functional value of the wetland in its existing condition. The WRAP score was 0.48 on a scale of 0 to 1. A score below 0.50 is considered low quality.

Figure 11-19. Water resources in the proposed project areas.

Figure 11-20. Jurisdictional wetlands in Gulf State Park.

Overall, the proposed impacts to wetlands, which would include replacing 0.076 acre of wetlands with 0.22 acre of wetlands, would lead to an increase in the total area of wetlands and an increase in the functions and values provided by wetlands. Consequently, the proposed impacts would be long term and beneficial.

Interpretive Center, Dune Restoration and Enhancement, and Research and Education Facility. As stated above, although soil mapping indicates there are tidal marshes in the vicinity of the research and education facility, the nature of this area has changed since the 1964 mapping, and it does not appear that tidal marshes are currently present at the site. Consequently, there would be no anticipated impacts to wetlands from construction of the interpretive center and research and education facility, or from the proposed dune restoration and enhancement project, because no wetlands are found in the vicinity of these proposed projects.

Trails. Constructing approximately 13 miles of new and enhanced recreation trails would require crossing approximately 7.6 acres of wetlands by raised boardwalks. The boardwalk bases would be driven into the ground to a minimum of 8 feet below the surface; however, there would be a minimum of approximately 5 feet between the base of the boardwalk and the wetland surfaces so that growth of emergent plants is not stunted. There would be a minimum of 0.75 inch between boardwalk slats to allow sufficient sunlight to reach the wetland plants beneath the boardwalk. Thus, there would be no loss of wetland area from this element of the proposed project. However, during construction, it may be necessary to lay down timber matting so that heavy construction equipment may cross over wetland areas without compacting the soil. Construction of the proposed piers in Lake Shelby would involve using pile drivers to place the foundations in the lake; this type of activity could potentially impact submerged wetlands. However, a survey for submerged aquatic vegetation was performed in August, 2013 (Volkert, 2013a), and the location of the piers was adjusted so there would be no direct impacts to submerged wetlands. Suspended sediment decreases the amount of light that can reach water bottoms; thus organisms that depend on sunlight for growth would be temporarily affected. However, sediment would settle shortly after construction was completed and would not impact these organisms long term.

Timber matting may temporarily injure wetland plants. However, BMPs would support replanting wetlands with native vegetation after removing the timber mats, addressing potential impacts. Consequently, impacts to wetlands to support trail construction would be adverse but short term and minor. After BMPs are implemented, adverse impacts to wetlands would be small, temporary, and localized.

Operation

Gulf State Park Lodge and Conference Center. Re-establishing the Gulf State Park Lodge and Conference Center would require filling 0.076 acre of wetlands. However, onsite mitigation would replace the lost wetlands and their associated function as discussed above under “Construction.” Prior to mitigation, the USACE and the GSP would prepare a wetland mitigation instrument document which would detail the development thresholds in order to measure the success of the proposed constructed wetland. Although this document has not been prepared, to date, the mitigation instrument generally details thresholds over a 10-year span; if during any monitoring cycle the thresholds are not achieved, action is required of the responsible party to bring the project in compliance. The proposed constructed wetlands

would be monitored to ensure they meet vegetation development thresholds prescribed in the mitigation instrument. Therefore, operation of the re-established lodge would include maintenance components so that the thresholds are satisfied, which would ultimately increase the function of the wetlands over time. Operation of the lodge would have long-term, beneficial impacts.

Interpretive Center, Dune Restoration and Enhancement, and Research and Education Facility. There would be no anticipated impacts to wetlands from operation of the interpretive center and research and education facility, or from the proposed dune restoration and enhancement project, because there are no wetlands in the vicinity of these proposed projects, or in the case of the research and education facility, the wetlands on site would not be impacted by the proposed development (Volkert, 2003).

Trails. Although there would be no losses of wetlands or USACE-regulated impacts from the proposed trails, boardwalks have the potential to shade plants under the boardwalks. The boardwalks would be designed to allow sunlight to penetrate the wetlands beneath them, although the intensity of sunlight would not be the same as if no boardwalks were in place. Wetland plant productivity would not cease as a result of the proposed activity, but it would be affected by the reduced amount of sunlight. However, the percentage of wetland plants affected throughout the park would be very low compared to the total acres of wetlands in GSP. Wetland functions would subsequently be reduced, but the reduction would be small and localized and result only in a *de minimis* change. Therefore, impacts to wetlands from the operation of the recreation trails would be long-term adverse but minor.

Surface Waters

Affected Resources

In addition to wetlands, other waters of the United States are present within GSP (Figure 11-20). The Gulf of Mexico is adjacent to the beaches in GSP, and it is a primary reason visitors come to the park. Additionally, three large lakes are prominent through the central portion of the park north of SR 182. These lakes include:

- Little Lake – approximately 40 acres located in the northeast portion of the park;
- Middle Lake – approximately 216 acres located in the central portion of the park, immediately south of the recreational vehicle (RV) parking area; and
- Lake Shelby – approximately 563 acres located in the western portion of the park.

The two smaller lakes are connected by a spillway, and both drain to Lake Shelby via a spillway connecting Middle Lake to Lake Shelby. Runoff from the RV campground also drains to Lake Shelby via a series of drainage ditches. Lake Shelby drains to Little Lagoon, which is located in Gulf Shores, Alabama.

The three lakes are primarily freshwater; however, they are classified as estuarine by the USFWS National Wetland Inventory (NWI) (USFWS, 2010) suggesting that the water is brackish. As mentioned above under “Soils and Wetlands,” a weir was constructed in 1991 in the drainage canal between Lake Shelby and Little Lagoon. The weir is designed to allow fresh water from Lake Shelby to drain to Little Lagoon and prevent brackish water from Little Lagoon from back flowing in to Lake Shelby. During extreme high tides brackish water still flows to Lake Shelby and during storm surges, Gulf water can

enter into both Lake Shelby and Middle Lake. However, the net effect of the weir, despite storm and tide events, Lake Shelby remains a primarily freshwater ecosystem.

Environmental Consequences

Construction

Gulf State Park Lodge and Conference Center, Interpretive Center, and Research and Education Facility and Dune Restoration and enhancement. During construction of the proposed Gulf State Park Lodge and Conference Center, interpretive center, research and education facility, and dune restoration and enhancement project elements, E&S BMPs, such as silt fencing, covering bare soils to prevent erosion, and reclaiming topsoil, would be employed to keep soil from entering into the lakes or the Gulf of Mexico. Additionally, pollution discharge permits, as discussed below under Section 3.1.2.3, *Water Quality*, would be acquired to protect water quality. Construction of the proposed project elements would contain design elements and require permits to maintain water quality and prevent excess soil from entering the waters; however, failure of the measures implemented under BMPs is possible if they are not properly maintained and inspected. As such, impacts to the Gulf of Mexico or the park's lakes from the construction of the Gulf State Park Lodge and Conference Center, interpretive center, and research and education facility and restoration of the dunes could be adverse but localized, short term, and minor. Any impacts would be small and localized, and would quickly become undetectable in the context of the larger water body, with the likelihood of failing BMPs minimized by regular inspection.

Trails. Construction of the approximately 13 miles of new and enhanced trails within GSP would include three short finger piers and two bridged walkways into and over Lake Shelby and its spillway. Approximately 1,140 feet and 0.25 acre of piers and bridges would extend into and over Lake Shelby. Construction of the proposed trails would require the same E&S BMPs as construction of the buildings to ensure that excess sediment does not leave the construction area and enter surface waters, groundwater, or wetlands. These BMPs would help minimize impacts.

Construction of piers and bridges in and over Lake Shelby constitutes work in navigable waters; therefore, a Section 10 permit from the USACE is required. Section 10 of the Rivers and Harbors Act protects navigable waters from unauthorized obstructions; any work taking place in or over Section 10 waters requires USACE authorization, regardless of whether or not there are proposed impacts. A Section 10 permit was requested as part of a General Permit and was granted by the Mobile District Corps of Engineers on September 24, 2013 (Permit no. SAM-2013-00917-JAB).

During placement of the piers and bridges into and over Lake Shelby, bottom sediment would be disturbed and become suspended. Suspended sediment decreases the amount of light that can reach water bottoms, thus organisms that depend on sunlight for growth would be temporarily affected. However, the sediment would settle shortly after construction was completed and would not impact these organisms long term. Therefore, impacts to surface waters from construction of the proposed trails would be adverse but short-term and minor because construction activities may temporally result in a change to water quality that is small and localized; after construction, water quality conditions would be expected to return to normal.

Operation

All Project Elements. All project elements would be constructed to include stormwater management plans to properly treat increased runoff so that excess pollutants do not enter surface waters. The area of impervious surfaces would increase because of the lodge construction, thus there could be a slight increase in runoff in the beach area. Runoff would be further minimized by the use of pervious pavement for all new facilities. Surface parking would be confined to areas beneath the buildings, limiting the increase of impervious area to the lodge building footprint. However, stormwater management BMPs would capture the increased sediment before it could run off the site towards the Gulf. Additionally, the extremely pervious nature of the beach sands would filter any runoff that may leave the site before the water reached the Gulf. All remaining project elements would not increase the impervious area in GSP. Thus, there would be no impacts to surface water from the operation of the Gulf State Park Lodge and Conference Center, dune restoration and enhancement, interpretive center, research and education facility, and recreation trails.

Water Quality

Affected Resources

States are required to establish and adhere to water quality standards, per the CWA. In Alabama, ADEM is responsible for establishing water quality standards; controlling discharges into surface and subsurface waters; developing waste treatment management plans and practices; and issuing permits for discharges of dredge and fill material into the waters of the United States. GSP and its waters are located in the Perdido River Basin Group, which was last monitored during the 2006-2010 River Basin Rotation schedule (ADEM, 2010). During this time, lakes in GSP were not identified as impaired. The Perdido River Basin Group is scheduled for monitoring in 2013 during the 2011-2015 River Basin Rotation schedule (ADEM, 2012). Water quality within the park is considered good because the highly permeable sands do not allow surface water runoff. Stormwater is rapidly absorbed and filtered by the native soils before reaching the Gulf of Mexico. The wave action and good current flow in the Gulf further enhance water quality.

Environmental Consequences

Construction

Gulf State Park Lodge and Conference Center, Interpretive Center, Research and Education Facility, and Trails. Water quality would be affected slightly during construction of the proposed facilities. Prohibitions on the use of certain fill materials, such as red clay, and the highly permeable nature of the majority of the soils within GSP would prevent pollutants and sediment-enriched stormwater from reaching the Gulf of Mexico through runoff or via groundwater infiltration. Percolation through the permeable soils would also filter pollutants, preventing them from reaching groundwater. E&S BMPs, as described above, would be installed during construction to control sedimentation, thus maintaining water quality.

Elements associated with the proposed projects would require an NPDES permit from ADEM. Although it is expected that small quantities of runoff would occur from construction activities associated with the proposed project elements, NPDES permits require establishment of BMPs during construction. These

BMPs would ensure that measures are taken to maintain the quality of water discharged from a construction site so that adjacent waters such as lakes, wetlands, and other water bodies do not receive an excessive amount of pollution that would change their water quality status. The U.S. Environmental Protection Agency (USEPA) requires incorporating the following components into an NPDES BMP plan (USEPA, 2012):

- Municipal oversight
- Construction site planning and management
- Erosion control
- Runoff control
- Sediment control
- Proper materials management

Additionally, the NPDES permit would require disposal of all construction waste and excavated material according to state and local requirements. The contractor would also be required to use legally operating landfills for the disposal of project-generated waste materials.

Elements associated with the proposed projects would result in small, localized changes in water quality. Impacts would occur during construction activities, and would become undetectable quickly after construction is complete because minor runoff from construction activities would cease and erosion control measures would be established after final grading. State water quality standards would not be exceeded. Therefore, impacts to surface water and water quality from construction would be adverse but short term and minor.

Dune Restoration and enhancement. Dune restoration and enhancement would involve planting native vegetation to prevent further deterioration of the dunes and to promote sand accretion. There are no earth-moving activities that would require E&S plans or water quality permits. As such, there would be no impacts to water quality from the construction phase of the proposed dune restoration and enhancement.

Operation

All Project Elements. After construction and final grading, permanent erosion control measures, such as vegetating bare soil and sensitive areas, would be employed. Current waste disposal practices, which consist of utilizing public sewers for human waste, would continue, and dumping regulations would remain in place. Therefore, there would be no anticipated impacts on water quality during the operation phase of the proposed project.

Floodplains

Affected Resources

The potential for coastal flooding in GSP was evaluated using Federal Emergency Management Agency (FEMA) map designated Community No. 015005, Panel Numbers 818, 819, 838, 839, and 956, Suffix K, as revised July 17, 2007. Federal Insurance rate maps (FIRM) indicate the project limits lie within Zones VE and AE. A Zone AE flood area (100-year floodplain) is defined as being high risk; a Zone VE flood area (coastal 100-year floodplain) is defined as a coastal flood area with velocity hazard (wave action) for

which base flood elevations have been determined. Construction of the recreation trails and research and education facility would occur in Zone AE, and re-establishment of the lodge, construction of the interpretive center, and dune restoration and enhancement would occur in Zone VE. More specifically, the lodge would be re-established in a VE+15 zone (see FIRM maps). The elevation of the first level of the lodge (level 1) would be determined accordingly, placing the first guest level (level 2) well above base flood elevation as determined by FEMA. This would allow for parking on the ground level and space for guest services such as laundry facilities and pool dressing rooms under the first guest level on level 1. Alabama maintains jurisdiction over GSP, and as such, construction within the park must meet the requirements of the state's floodplain management plan. Additionally, construction within GSP must meet FEMA requirements; both the state and federal requirements restrict or prohibit activities that would raise the flood zone level in areas susceptible to flooding.

Environmental Consequences

Flooding in GSP and the areas adjacent to the park is not from rivers flowing over their banks; instead, the majority of flooding is from tidal surges produced by tropical storms and hurricanes. Because all of the structures constructed as part of the proposed project would be built on piles to allow flood waters to flow unobstructed beneath them, there would be no obstructions or encroachments on the current floodplain. Therefore, the proposed project would not result in an increase in flood levels within the park or the adjacent community during a 100-year flood discharge.

Construction

All Elements of the Proposed Project. The portion of GSP south of SR 182 is located adjacent to the CCL; therefore, re-establishing the Gulf State Park Lodge and Conference Center and building the interpretive center would require a Coastal Zone Management (CZM) permit, authorized by ADEM. A CZM permit request was submitted to ADEM in June 2013. Correspondence received from ADEM on August 14, 2013, issued a non-regulated use permit for the construction of the re-established lodge and interpretive center, indicating that these projects would be consistent with the CZM regulations. Dune restoration and enhancement is currently occurring in GSP, for which there is a current CZM permit; continuing to restore the dunes over a larger area would require maintaining the current CZM permit. Construction of all of the proposed project elements would not create a rise in base flood elevation, nor would construction activities raise the floodplain level. Construction of the proposed project elements would be in compliance with all required permits and would not result in changes to the coastal zone; therefore, impacts to the floodplain or the coastal zone are not anticipated.

Operation

Gulf State Park Lodge and Conference Center. The Coastal Zone Management Act requires that work within the coastal zone be consistent with the CZM program and not have a significant adverse impact on coastal resources. The program discourages placing structures seaward of the CCL to protect the integrity of the beaches and primary dunes. The majority of the elements associated with the proposed project would be constructed landward of the CCL. Six dune walkovers would be constructed, in part, seaward of the CCL, but would be constructed consistent with the ADEM Coastal Program rules requirements and would have minimal impacts on the primary dunes. In addition, on August 14, 2013, ADEM issued a non-regulated use permit for the construction of the re-established lodge and

interpretive center, indicating that these projects would be consistent with the CZM regulations (Permit No.CCB&D-03-017-A). Therefore, the proposed project elements would maintain consistency with the CZM program.

The re-established lodge would have no effect on the current base flood elevation. The dune walkovers associated with the re-established lodge would be permanently placed seaward of the CCL. However, there would be no appreciable change to the floodplain, and no increased risk to human safety and welfare would result. Therefore, impacts to floodplains and the coastal zone from the operation of Gulf State Lodge would be long-term and adverse but minor because there would only be a small and localized change, and the project would be in compliance with all state CZM regulations.

Dune Restoration and enhancement, Interpretive Center, Research and Education Facility, and Trails. The interpretive center and the research and education facility would be built on piles so that flood waters would flow beneath them. Thus, these buildings would not raise base flood elevation. Additionally, dunes are a natural component of the Gulf beach ecosystem, and restoration of the dunes would not affect the floodplain or the coastal zone. Maintaining the trail system would involve activities similar to construction; none of which would increase the base flood elevation or increase the risk of flooding. Therefore, operation of these elements of the proposed project would not have impacts on the floodplain or coastal zone.

11.7.6.3 Air Quality and Greenhouse Gas Emissions

Affected Resources

The USEPA 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 and the 1977 and 1990 Clean Air Act Amendments, the USEPA has promulgated National Ambient Air Quality Standards (NAAQS). The NAAQS include primary standards that set limits to protect public health, including the health of "sensitive" populations such as asthmatics, children, and the elderly. To date, the USEPA has issued NAAQS for seven criteria pollutants: carbon monoxide (CO), sulfur dioxide, particles with a diameter less than or equal to a nominal 10 micrometers (PM10), particles with a diameter less than or equal to a nominal 2.5 micrometers (PM2.5), ozone, nitrogen dioxide, and lead. Individual states may promulgate their own ambient air quality standards for these “criteria” pollutants, provided that they are at least as stringent as the federal standards. Air quality in GSP is considered good, due to the lack of emission sources (with the exception of vehicular traffic) and the presence of ocean breezes and wind circulation. Air quality in Baldwin County (including the project area) meets all USEPA NAAQS. Because Baldwin County is in attainment for all criteria pollutants, general conformity does not apply. Air quality in GSP is considered good, due to the lack of emission sources (with the exception of vehicular traffic) and the presence of ocean breezes and wind circulation. Air quality in Baldwin County (including the project area) meets all USEPA NAAQS. Because Baldwin County is in attainment for all criteria pollutants, general conformity does not apply. Table 11-8 presents both State of Alabama and federal primary ambient air quality standards for criteria air pollutants.

Table 11-8. State and federal ambient standards for criteria air pollutants.

POLLUTANT	AVERAGING PERIOD	FEDERAL PRIMARY STANDARD	ALABAMA STATE STANDARD

Ozone	8-hour	0.075 ppm	Same as Federal
PM2.5	Annual (arithmetic mean)	15.0 µg/m3	Same as Federal
	24-hour	35 µg/m3	Same as Federal
PM10	24-hour	150 µg/m3	Same as Federal
Carbon Monoxide	8-hour	9 ppm	Same as Federal
	1-hour	35 ppm	Same as Federal
Nitrogen Dioxide	Annual (arithmetic mean)	0.053 ppm	Same as Federal
	1-hour	0.100 ppm	Same as Federal
Sulfur Dioxide	1-hour	75 ppb	Same as Federal
ppm = parts per million ppb = parts per billion Source: USEPA, 2011.			

Nearby sensitive receptors include park visitors, residences, apartment buildings, and hospitals located outside the park boundaries as follows:

- Re-establishment of the Gulf State Park Lodge and Conference Center—the nearest receptors outside the park are the condominiums located approximately 0.4 mile west.
- Interpretive Center and Dune Restoration and Enhancement—the nearest receptors outside the park are the residences located approximately 0.4 mile east.
- Research and Education Facility—the nearest receptors are the short-term camping vehicles located approximately 300 feet from the proposed facility and visitors using the swimming pool, approximately 250 feet northwest of the proposed facility, and the lake, approximately 150 feet east at its closest approach.

Environmental Consequences

Construction-Stationary Source Emissions

Gulf State Park Lodge and Conference Center, Interpretive Center, and Research and Education Facility. Construction of the Gulf State Park Lodge and Conference Center, the interpretive center, and research and education facility would require earth-moving activities and involve diesel-powered construction equipment. Exhaust from non-road construction equipment would result in emissions of air pollutants during various phases of the construction period. Construction activities associated with the proposed project are expected to be typical of other similar construction projects and would include mobilization of equipment, site preparation, delivery of construction materials using heavy-duty trucks, pile driving, placing foundations, pouring concrete and installing building components, and providing utility connections.

During the various phases of construction, on-site equipment may include a hydraulic crane, front-end loaders, backhoes, concrete mixing and pumping trucks, generators and compressors, and welding machines. Because construction activities are expected to be temporary and the use and number of construction equipment would be limited, operation of the construction equipment would be unlikely to result in high emissions.

Construction activities such as excavation, grading, soil handling, and vehicles traveling on dirt road surfaces have the potential to create fugitive dust emissions. Fugitive dust can also be generated by and

from wind erosion of stockpiled materials. If necessary to control dust emissions, contractors would be required to implement fugitive dust control measures, such as watering exposed areas, installing dust covers on trucks, and using tracking mats to reduce dust emissions from truck tires. Dust generated by construction on sandy soils consists of mostly relatively large particles that would settle within a short distance from the construction activities.

Other emission reduction measures, if necessary, could include:

- Use of ultra-low sulfur diesel fuel in off-road construction equipment with engine horsepower (HP) rating of 60 HP and above.
- Limiting unnecessary idling times on diesel-powered engines to 3 minutes.
- Locating diesel-powered exhausts away from fresh air intakes.
- Controlling dust related to construction site activities through a Soil Erosion Sediment Control Plan that includes spraying of a suppressing agent on dust piles (non-hazardous, biodegradable).
- Covering trucks hauling loose materials.

Construction of the proposed project is expected to cause short-term minor adverse impacts on air quality. Impacts on air quality would be localized and temporary, such that the emissions would not exceed the USEPA's *de minimis* criteria for a general conformity determination (either for each construction project separately or in combination should construction schedules overlap); therefore, impacts would be adverse but short term and minor.

Dune Restoration and Trails. Construction activities associated with the trails would require little or no heavy construction equipment. Most of the work would be conducted by crews using hand tools, and much of the restoration would be accomplished by the natural accretion of sand that would occur after strategic but minor engineering such as the seeding of beach plants. Earth-moving equipment would not be required. Any emissions from construction related to these two project elements would be minimal and short term, lasting no more than six months over the construction period. Any impacts would be small, localized, and temporary and would not result in emissions that separately, or combined with other project elements, exceed USEPA's *de minimis* criteria for general conformity determination; therefore, impacts would be adverse but short term and minor.

Operation

Stationary Source Emissions. The re-established Gulf State Park Lodge and Conference Center, new interpretive center, and research and education facility would consume fossil fuels for heating and hot water. Electricity requirements would be met by local suppliers and would not be generated in GSP.

The Gulf State Park Lodge and Conference Center would be built to include sustainable design features and may seek LEED, Living Building, or similar certification, and as such, would incorporate resource conservation measures and technology to reduce energy use, including roof and paved surfaces that reflect light and heat, shading devices, recycling programs, and efficient HVAC systems. Due to the size (approximately 3,500 SF) and nature of the interpretive center and the research and education facility, these facilities would not be large emission sources and would not require large amounts of energy for hot water or space cooling. Operation of the proposed project would cause long-term impacts to air

quality that may be measurable, but would be localized and would not exceed the USEPA's *de minimis* criteria for a general conformity determination.

Operation of the trail and dune restoration components of the proposed project would not contribute to stationary source emissions.

Operation of all proposed project elements would not increase fugitive dust, and no impacts to atmospheric concentrations of dust are anticipated. Impacts from stationary source emissions during operation would be long term and adverse but minor because the impact on air quality may be measurable. These would be localized and temporary, and emissions would not exceed the USEPA's *de minimis* criteria for a general conformity determination.

Mobile Source Emissions. It is estimated that the re-established Gulf State Park Lodge and Conference Center would generate a maximum of 810 inbound and outbound automobile trips in the A.M. and P.M. peak hours assuming that the lodge is fully occupied and the conference center attracts a total of 1,500 attendees on a peak day. Emissions of CO are highest in congested conditions with extensive idling (known as level of service [LOS] F).[1] The relatively free-flowing traffic conditions projected for the proposed project would be unlikely to generate CO concentrations that exceed NAAQS. The traffic analysis (detailed further below under "Transportation") shows that the intersection LOS would be C or better for all roadway approaches once the lodge is re-established, with the exception of one instance of LOS D. All approaches for all time periods would have an LOS A, B, or C except for the SR 135 approach to SR 182, which would operate at LOS E.

In Mobile, Alabama, which has the CO monitoring station closest to the Gulf State Park, for 2003 the maximum CO concentrations for the 1-hour and 8-hour standards were 2.2 ppm and 1.2 ppm, respectively. These figures are significantly lower than the NAAQA of 35 ppm and 9 ppm. Because the project area would remain relatively uncongested, and (2003) CO concentrations in a more densely populated and congested area located nearby are well below the applicable standards, a detailed CO hot-spot analysis is not warranted.

Re-establishment of the lodge would require delivery of goods and supplies for everyday operation of the new facilities. Most of these deliveries would involve smaller gasoline-powered or diesel-powered panel trucks and vans. Few heavy-duty diesel trips are expected for operation of the proposed project; therefore, particulate matter concentrations (which are highest for heavy-duty diesel vehicles) would not be a concern.

Operation of the trails and interpretive center are expected to draw from visitors already at the park and, therefore, any additional impacts to in the park or along approaches to the intersections would be *de minimis*. Operation of the research and education facility is expected to draw visitors who might not otherwise visit the park and would therefore increase traffic to the park. However, due to the size and nature of the research and education facility, traffic is not expected to result in LOS deterioration at

[1] See Figure F-29 of the following document, which shows general CO emissions rates by LOS based on EPA emissions model (MOVES2010): http://www.volpe.dot.gov/coi/ees/air/docs/regional_leve_sensitivity_analysis_121012.pdf.

intersections in the park or along approaches to the intersections. Dune restoration activity would not contribute to mobile source emissions.

Mobile source emissions associated with operation of all elements of the proposed project are expected to cause long-term and adverse, but minor, impacts on air quality. These would be localized and are not expected to exceed the USEPA's *de minimis* criteria for a general conformity determination.

Greenhouse Gas. Global warming as the result of the emission of greenhouse gases (GHGs) is an issue of long-term and international significance. GHGs include water vapor, carbon dioxide (CO_2), methane, nitrous oxide, ozone, and halocarbons (CFCs). Of the anthropogenic GHGs, CO_2 is the most prevalently emitted from human-made uses, including internal combustion engines and burning other fuel materials. For the proposed project, incremental GHG emissions would be associated with energy consumption and use for the construction and operation of the proposed buildings and facilities, and by energy used by automobiles traveling to and from the park.

A unit of 25,000 metric tons of CO_2-equivalent (CO2e) GHG emissions per annum is used here as a threshold to gauge whether a more detailed analysis should be considered. The 25,000 metric tons of CO_2 provides a useful threshold for discussion and disclosure of GHG emissions because it has been used and proposed in rulemaking under the Clean Air Act (e.g., USEPA Mandatory Reporting of Greenhouse Gases Final Rule, 74 FR 56260, October 30, 2009). In addition, draft NEPA guidance from the Council on Environmental Quality (CEQ) on climate change and GHG effects also uses the reference point of 25,000 metric tons of CO2e greenhouse gas emissions, although this figure is not a significance threshold (CEQ, 2010).

The Gulf State Park Lodge and Conference Center would be built to include sustainable design features and may seek LEED, Living Building, or similar certification, which emphasize energy efficiency; therefore, GHG emissions are anticipated to be smaller than those generated by similar buildings and facilities that are not certified with such a program.

Results of an evaluation regarding GHG emissions from a similar facility of similar size identified GHG emissions of approximately 1,283 metric tons of CO2e emissions on an annual basis (Northern Arizona University, 2010). The evaluation considered electricity use, natural gas, mobile combustion, and refrigeration/air conditioning units. Because a similar facility generated approximately 1,283 metric tons of CO2e emissions on an annual basis, it can be expected that the proposed project would generate less depending upon the energy use reduction achieved and the energy source.

Due to the relatively small scale of the project, a detailed construction phase assessment of the GHG emissions was not conducted. However, research regarding assessments of construction phase GHG emissions resulting from other construction projects was conducted to determine if the proposed project would approach the 25,000 metric ton CO2e per year threshold. An assessment of construction phase GHG emissions for a project involving approximately 1.48 million square feet of warehouse and industrial facilities determined that construction of the project would result in a total 2,568.3 metric tons of GHG emissions (Appendix F: March Business Center, Greenhouse Gas Analysis, City of Moreno Valley, California, October 31, 2011). The total GHG emissions were amortized over the life of the project (30 years) and added to the annual operational GHG emissions.

The analysis considered site preparation (approximately 65 acres), grading, paving, building construction (approximately 1.48 million square feet) and architectural coatings (painting). Construction equipment used in the evaluation included water trucks, scrapers and graders, dozers, loaders and backhoes, excavators, paving equipment, cranes and forklifts, air compressors and generators and welders. The equipment list considered for the evaluation exceeds that for the proposed project. As such, it is expected that GHG emissions for the construction of the proposed project would be less that 2,568.3 metric tons of total CO2e.

Because the interpretive center and research and education facility would be much smaller than the lodge, GHG emissions would be commensurately smaller. The total combined construction phase and operational phase GHG emissions for the lodge, interpretive center, and research and education facility would be well below the 25,000 metric ton CO2e standard. Operation of the trails and the dune restoration would not contribute to GHG emissions.

Operation of the combined elements of the proposed project are expected to cause long-term, minor, and adverse impacts to GHGs but would be localized and not expected to exceed standards provided in CEQ guidance.

11.7.6.4 Noise

Affected Resources

Noise levels at GSP for all the proposed project elements are influenced by vehicular traffic, typical landscaping activities, maintenance of commercial buildings, and limited seasonal recreational activities. Under certain conditions, sound levels generated by high waves and high wind would be the dominant sounds near the Gulf shore. Otherwise, the predominant sources of noise experienced at the lodge and interpretive center sites are automobile and truck traffic from SR 182 to the north of these sites, and beach-related recreational activity to the south. At the research and educational facility, the predominant noise sources are from recreational activities from the adjacent nature center, pool, amphitheater, and other amenities; ground maintenance; and occasional watercraft traffic on the adjacent lake and the Gulf of Mexico.

Environmental Consequences

Construction

Construction activities generate variable noise levels depending on the type, number, and operating schedules of equipment. Construction activities are usually executed in stages, each having its own combination of equipment and noise characteristics and magnitudes. Construction activities associated with the proposed project are expected to be similar to those of other similar construction projects and would include mobilization of equipment, site preparation, pile driving, placing foundations, pouring concrete and installing building components, and providing utility connections. The loudest noise sources expected from construction of the facilities is from driving foundation piles using a pile driver, earth-moving activities using front-end loaders, and concrete pouring using concrete mixing and pumping trucks. This construction work would occur during the early stages of project and would be short term and temporary. Other noise-generating construction activities could include using cranes to erect steel superstructure components and to install exterior building components, such as chillers, wall curtains, walls, and windows.

The nearest human receptors outside the park boundaries are the occupants of the condominiums located along the Gulf shore approximately 0.4 mile west of the re-established Gulf State Park Lodge and Conference Center and those located approximately 0.4 mile east of the interpretive center. Within the park, the fishing pier and adjacent beach would be closer to construction activity for the Gulf State Park Lodge and Conference Center. At the water's edge, the pier would be approximately 500 feet from construction activity associated with the lodge, while users of the beach would be as close as 100 feet to construction activity. Construction of the research and education facility would occur next to the Campground Pavilion, which includes the swimming pool and other recreation functions. Visitors in the pool would be approximately 250 feet from the nearest construction activity.

Table 11-9 illustrates some common noise sources and their sound pressure levels. Noise levels in a quiet rural area at night are typically between 32 and 35 decibels (dB). Quiet urban nighttime noise levels range from 40 to 50 A-weighted decibels (weighted to account for the relative loudness perceived by the human ear and designated as dBA). Noise levels during the day in a noisy urban area are frequently as high as 70 to 80 dBA. Noise levels above 110 dBA become intolerable and then painful; levels higher than 80 dBA over continuous periods can result in hearing loss. Constant noises tend to be less noticeable than irregular or periodic noises.

Typical peak construction noise levels within 50 feet of construction activities would likely be considered very loud, comparable to peak crowd noise at an indoor sports arena. At approximately 200 feet, peak construction noise levels would be considered loud, comparable to a vacuum cleaner at 10 feet. At 2,000 feet (approximately 0.4 mile), construction noise levels would be considered minimal.

Construction activities necessary to support the proposed project would result in temporary noise increases within the area of each project component (e.g., the Campground Pavilion, fishing pier, and beach). Noise would be generated primarily from heavy equipment used in hauling materials and building new facilities. These impacts would be minimized in areas with night use (the Camping Pavilion, for example) by limiting construction to daylight hours and using material haul routes designed to avoid sensitive noise receptors. Depending on the origin of construction materials, a haul route that runs through the park on SR 135 would avoid private dwellings, businesses, condominiums, and public beaches that are located within the city limits of Gulf Shores along SR 182. Due to the construction site's geographical isolation (more than 0.5 mile from private residences and approximately 0.4 mile to the condominiums to the west of the Gulf State Park Lodge and Conference Center site and to the east of the interpretive center site), these sensitive noise receptors should not be impacted by the unavoidable on-site construction-related noise. Fishermen who use the state park pier and visitors to the beach, however, could be impacted by these nearby sources of noise. This impact is considered minor and short-term because construction activities would be far enough away from receptors to lessen the noise and the noise would only occur during daylight hours for the short period of construction.

Table 11-9. Environmental Noise.

NOISE SOURCE	SOUND PRESSURE LEVEL
Weakest sound heard	0 dBA
Whisper Quiet Library at 6 feet	30 dBA
Normal conversation at 3 feet	60-65 dBA
Telephone dial tone	80 dBA

NOISE SOURCE	SOUND PRESSURE LEVEL
City Traffic (inside car)	85 dBA
Train whistle at 500 feet, Truck Traffic	90 dBA
Jackhammer at 50 feet	95 dBA
Subway train at 200 feet	95 dBA
Level at which sustained exposure may result in hearing loss	*90 – 95 dBA*
Hand Drill	98 dBA
Power mower at 3 feet	107dBA
Snowmobile, Motorcycle	100 dBA
Power saw at 3 feet	110 dBA
Sandblasting, Loud Rock Concert	115 dBA
Pain begins	*125 dBA*
Pneumatic riveter at 4 feet	125 dBA
Even short term exposure can cause permanent damage - Loudest recommended exposure WITH hearing protection	*140 dBA*
Jet engine at 100 feet	140 dBA
12 Gauge Shotgun Blast	165 dBA
Death of hearing tissue	180 dBA
Loudest sound possible	194dBA
Source: Centre for Human Performance & Health, Ontario, Canada, 2007.	

Construction of the proposed project is expected to last approximately up to two years. Construction of any one of the project elements (i.e., the lodge, interpretive center, research and education facility, trails, and dune restoration) may be less than two years. For the lodge and interpretive center, the distance between the shoreline and construction activities associated with these proposed facilities is more than 400 feet. Depending on the level of sound generated by waves and wind at the shoreline, construction noise would be masked by ambient sounds. In addition, if visitors are disturbed by construction noise, other areas of beach with lower levels of construction noise are within walking distance. However, fishermen who use the state park pier and visitors to the beach near the construction sites could be impacted by these nearby sources of construction noise. This impact is considered to be minor and short term (two years or less), and would only occur during daylight hours.

Construction equipment associated with the trail upgrades and dune restoration and enhancement would consist of hand tools and small tools powered by battery or small gasoline motors. Increased noise could attract attention, but its contribution to the soundscape would be localized and not of consequence, nor would it affect current user activities and would therefore have short-term, minor, adverse impacts.

In addition to building development, construction would also include related infrastructure improvements, including upgrades to the existing water main that extends along the south side of SR 182. The existing service extends from the city of Gulf Shores, west of the park, to the site of the proposed interpretive center. At the western edge of the park, the size of the water main changes from a 16-inch diameter pipe to a 6-inch pipe. The 6-inch water main would be replaced with a 16-inch main, extending from the western edge of the park to the interpretive center. Construction of this upgrade would involve backhoes, trenching machines, welding machines, dump trucks, and material delivery trucks, and would progress in a linear fashion along the south side of the highway—as one section is finished, the equipment would move to the next segment. Noise generated by this construction activity

at any point along the highway would be short term and temporary. During installation of the new water main at the western edge of the park, construction noise would be audible at receptors in Gulf Shores—the condominiums located approximately 200 and 500 feet to the west. However, this noise would be largely masked by the existing roadway noises. Construction of the proposed project would result in minor, short-term impacts. Increased noise generated by construction activities could attract attention, but its contribution to the soundscape would be localized and not of consequence, nor would it affect current user activities.

In addition to producing sounds for communication, animals continuously detect sounds that signal danger and potential food sources. Appropriate soundscapes are important for animal communication, territory establishment, courtship and mating, nurturing young, and effective use of habitat. Scientific studies have shown that wildlife can be adversely affected by high levels of noise. Although the severity of the impacts varies depending on the species under consideration and other conditions, research has found that wildlife can suffer adverse physiological and behavioral changes from noise and other human disturbances (FHWA, 2004). However, noise standards do not generally exist for wildlife, except in a few instances where federally listed species may be impacted.

During construction, noise generated by equipment may affect animal populations located near construction activities. However, habitat unaffected by construction noise exists nearby, and it is expected that animals would move to areas with less noise. Additionally, the periods of noisy construction activity are short-term and temporary. Additional information regarding the effects of the project on wildlife, including noise, is detailed below.

Operation

A project could have a noise effect if it generates new sources of substantial noise, increases the intensity or duration of noise levels to sensitive receptors, or results in exposure of more people to unacceptable levels of noise. The re-established lodge would not introduce new sources of noise and would not expose visitors to high levels of noise. The interpretive center and research and education facility would not generate high levels of noise during operation and would not expose park visitors, employees, or receptors outside the park boundaries to high levels of ambient noise. Visitors using the upgraded trail system are not expected to contribute to noise levels at receptors, nor are they expected to experience excessive noise from outside sources.

Operation of the proposed project would result in minor, long-term impacts. Increased noise generated by operation of the proposed project could attract attention, but its contribution to the soundscape would be localized and not of consequence, nor would it affect current user activities.

11.7.6.5 Biological Environment

Biological resources include native or naturalized plant and animal species and the habitats within which they occur. Plant associations are referred to generally as vegetation, and animal species are referred to as wildlife. Habitat can be defined as the resources and conditions present in an area that support a plant or animal. Although the existence and preservation of biological resources are intrinsically valuable, these resources also provide aesthetic, recreational, and socioeconomic values to society. For the purpose of this document, these resources focus on species or vegetation types that are important to the function of the surrounding ecosystem, are of societal importance, or are protected under federal

or state laws or statutes. These resources are divided into three categories: vegetation, wildlife, and special-status species, the latter including state and federally listed threatened or endangered species and other sensitive species.

This section does not describe or address impacts to essential fish habitat or marine species or in-water marine habitat such as coral reefs, marine fisheries, or shellfish because all activities would occur on land and these habitats would not be disturbed. Where activities would be conducted in proximity to the water, such as the proposed trail enhancements, these resources are not present.

11.7.6.6 Vegetation

Affected Resources

Six plant communities are present in GSP (Reetz, Personal Communication, 2013), including maritime forests, low wetlands, dunes and old dunes, bogs, marshes, and submerged aquatic vegetation. Each of these plant communities supports a different array of plant species. Although there is some crossover of species in the ecotones, the majority of the plant communities maintain a specific set of plant species.

The maritime forest contains primarily upland forest species. These areas are dominated by large trees such as pignut hickory (*Carya glabra*), oaks (*Quercus* sp.), pines (*Pinus* sp.), Southern magnolia (*Magnolia grandifolia*), and red maple (*Acer rubrum*). Beneath the trees, the maritime forest contains a thick understory of shrubs and herbaceous species, including blueberries (*Vaccinium* spp.), dwarf huckleberry (*Gaylussacia dumosa*), wax myrtle (*Myrica cerifera*), hollies (*Ilex* sp.), and coreopsis (*Coreopsis tinctoria*). The proposed recreation trails would be constructed, in part, through the maritime forest. Table A1-1 (see attachment A) contains a list of plant species observed in the maritime forests within GSP (Reetz, Personal Communication, 2013).

The low wetland communities are dominated primarily by plants that are adapted to living in saturated soils, but not in frequently inundated soils. This distinction differentiates them from marsh species, which are discussed below. In the park, low wetlands include palustrine forested wetlands, dominated by pines, oaks, and water tupelo (*Nyssa aquatic*); palustrine scrub-shrub wetlands, dominated by black willow (*Salix nigra*), elder berry (*Sumbucus canadensis*), saw palmetto (*Serenoa repens*), and sweet bay (*Magnolia virginiana*); and palustrine emergent wetlands, dominated by a number of herbaceous species, including cardinal flower (*Lobelia cardinalis*), cinnamon fern (*Osmunda cinnamomea*), chain fern (*Woodwardia fimbriata*) and royal fern (*Osmunda regalis*). Table A1-2 (see attachment A) contains a list of plant species observed in the low wetlands within GSP (Reetz, Personal Communication, 2013).

Dunes are described above under “Geology.” The re-establishment of the lodge, construction of the interpretive center, and dune restoration and enhancement would occur in the dune area. A healthy plant community is critical to the survival of dune ecosystems because the root structure of the plants holds the easily shifted sands in place. Restoration and enhancement of the dunes in GSP includes planting specific species that naturally occur in dune ecosystems. Observed dune plants within GSP include sand pine (*Pinus clausa*), short leaf pine (*Pinus echinata*), sand live oak (*Quercus geminata*), sea oats (*Uniola paniculata*), beach grass (*Panicum amarum*), and beach sunflower (*Helianthus debilis*). Table A1-3 (see attachment A) contains a list of plant species observed in the dunes and old dunes in GSP (Reetz, Personal Communication, 2013).

Bog communities are unique habitats that generally contain plant species only able to grow in bogs. Bogs are generally defined as depressional areas with no large inflows or outflows of water; water is generally acidic and the soils are low in nutrient content. Additionally, bog soils are often composed of decaying plant matter, usually mosses, and have very little mineral material. The hydric soils in GSP would be the primary location of bogs within the park. Within GSP, not only do the bogs contain unique plant species, but they also contain state rare species such as bog buttons (*Lachnocaulon anceps*), hatpins (*Eriocaulon compressum*), meadow beauties (*Rhexia* sp.), pitcher plants (*Sarracenia* sp.), purple bladderwort (*Utricularia purpurea*), and yellow-eyed grass (*Xyris iridifolia*) (South Alabama Regional Planning Commission, 1998). Table A1-4 (see attachment A) contains a list of plant species observed in the bogs present in GSP (Reetz, Personal Communication, 2013).

Marshes in GSP include areas with plants whose root system can withstand more frequent durations of inundation than plants located in the low wetlands. Observed plant species in the marshes of GSP include cattail (*Typha latifolia*), rushes (*Juncus* sp.), bulrushes (*Scirpus* sp.), sawgrass (*Cladium jamaicense*) and water lily (*Nymphaea odorata*). Table A1-5 (see attachment A) contains a list of plant species observed in the marshes in GSP (Reetz, Personal Communication, 2013).

Submerged Aquatic Vegetation was observed in Lake Shelby during an August 2013 survey of the area (Volkert, 2013a). Lake Shelby is a naturally occurring shallow, primarily freshwater, lake. It is connected to the smaller adjacent lake to the east by way of a narrow manmade canal. Periodical storm events generate a tidal surge that washes over the strait that separates this lake from the gulf. These storm surges temporarily increase salinity within the lake. The species of sea grasses endemic to this area include but are not limited to: tapegrass (*Vallisneria americana),* widgeon grass (*Ruppia maritime),* shoal grass (*Halodule beaudettei*), and turtle grass (*Thalassia testudinum*). Sea grass distribution is regulated by several factors such as temperature, depth, salinity, sunlight, and substrate. In Alabama, all four of these species are limited to high to moderate visibility and sandy to moderately sandy substrates. During the August 2013 survey, wigongrass and tapegrass were observed in Lake Shelby. Prior to this survey, no submerged aquatic vegetation had been observed in this area.

Table A1-6 (see attachment A) lists the invasive plant species identified within GSP (Reetz, Personal Communication, 2013).

Environmental Consequences

Construction

Dune Restoration, **Gulf State Park Lodge and Conference Center, Interpretive Center, and Research and Education Facility**. Construction of the re-established Gulf State Park Lodge and Conference Center, interpretive center, and research and education facility would involve removing vegetation near the proposed project elements. Construction equipment would injure vegetation as it maneuvered through the work areas. However, after final grading is completed, bare areas would be replanted with native vegetation to stabilize soils. In the areas of lodge and interpretative center, there is limited dune vegetation and invasive species that would be removed as part of construction. Near the research and education facility, only maintained lawn would be disturbed. Therefore, impacts to vegetation during construction would be adverse but localized, short term, and minor. Impacts would be detectable but

localized; natural conditions would not measurably be altered; and natural processes in the area would be sustained.

Trails. During construction of the proposed trails, although trails would be placed in some already disturbed areas such as utility corridors, some tree and plant removal would occur. Although the number of trees and plants removed would likely be nominal, their removal would still be considered an impact. At this time, the exact number of trees and species types to be removed is not known; however, potential trees that could be removed include a variety of oaks, pines, and hickories. Additionally, popcorn trees (*Sapium sebifera*) and common reed (*Phragmites australis*), which are invasive species, would be encouraged to be removed. During construction activities, it may be necessary to lay down timber matting for heavy construction equipment to cross wetland areas without compacting the soil. Timber matting may temporarily injure wetland plants; however, it is a recognized BMP to replant wetlands with native vegetation after removing the timber mats. Submerged aquatic vegetation may experience impacts during construction because there could be blockage of light to the vegetation from boardwalks; however, per the USACE permit, boardwalks would be as tall as they are wide, which would limit the blockage of light to the plants and allow them to continue to function. Impacts on vegetation from construction of this element of the proposed project would be adverse but short term and minor because the following measures would be taken: limited trees would be removed; boardwalks would be put over areas of emergent, herbaceous vegetation; and timber matting would be used. In addition, due to the height of the boardwalks over the herbaceous vegetation, it is expected that the adjacent natural areas would naturally revegetate any areas disturbed by construction. These impacts would be detectable but localized, natural conditions would not measurably be altered, and natural processes in the area would be sustained.

Dune Restoration and enhancement. Dune restoration and enhancement, following guidance from the HCP, would include planting native vegetation such as trees, shrubs, and herbs. Small construction equipment would be used to transport the plants to the restoration sites, which would likely cause some existing vegetation to be damaged or destroyed. However, since the project involves planting vegetation, affected vegetation would be replaced. Therefore, impacts to vegetation from construction would be adverse but short term and minor. Impacts would be detectable but localized; natural conditions would not measurably be altered; and natural processes in the area would be sustained.

Operation

Gulf State Park Lodge and Conference Center. As discussed under "Wetlands," re-establishment of the Gulf State Park Lodge and Conference Center would require filling 0.076 acre of palustrine wetlands; but would also include the construction of 0.228 acre of replacement wetlands. Therefore, the area of wetland vegetation would increase. Additionally, native dune vegetation would be planted within the facility's footprint. Beneficial impacts would also occur from the additional interpretation and educational materials available at the facility that would make visitors more aware of the park's natural resources and more likely to avoid damage to those resources. Therefore, the proposed Gulf State Park Lodge and Conference Center would have long-term and beneficial impacts on vegetation.

Interpretive Center and Research and Education Facility. Upon completion of construction of the interpretive center and research and education facility, native dune vegetation would be planted to

minimize soil erosion and as part of the interpretive exhibit highlighting dune restoration. The research and education facility location, which currently consists of maintained lawn, would be, in part, replaced by native vegetation that would improve the plant biodiversity within GSP. Because native vegetation would replace maintained grass and would prevent soil erosion after construction, impacts from the operation of these proposed project elements would be long term and beneficial. Beneficial impacts would also occur from the additional interpretation and educational materials available at the facility that would make visitors more aware of the park's natural resources and more likely to avoid damage to those resources.

Trails. As noted above under Wetlands, there would be no loss of wetlands from the construction of approximately 7.5 acres of boardwalks through wetland communities. The boardwalk bases would be driven into the ground to a minimum of 8 feet below the surface; however, there would be a minimum of approximately 5 feet between the base of the boardwalk and the wetland surfaces so that emergent plants are not stunted. There would be a minimum of 0.75 inch between boardwalk slats to allow sufficient sunlight to reach the wetland plants beneath the boardwalk so that they do not die. However, wetland vegetation productivity would be slightly impacted since less sunlight would be available to the plants beneath the boardwalk. Beneficial impacts would occur from the additional interpretation and educational materials available at the facility that would make visitors more aware of the park's natural resources, and more likely to avoid damage to those resources.

The proposed trails would be built, in part, in the campgrounds north of Middle Lake to replace dirt trails that have been formed by visitors over the years and in already disturbed utility corridors. Use of the newly constructed trails would deter visitors from off-trail use, which would have beneficial impacts on vegetation communities that would recolonize formerly impacted off-trail areas. Therefore, impacts to vegetation from the expansion of the trails would be long term and beneficial.

Dune Restoration and enhancement. The proposed dune restoration and enhancement would restore approximately 50 acres of dunes on the Gulf side of GSP. As part of this project element, native dune vegetation would be planted throughout the different dune sections (primary dunes, secondary dunes, interdunal swales, and scrub dunes) to stabilize the dunes and allow for greater sand accretion. Therefore, this proposed project element would increase the total acreage of dune vegetation. Because native vegetative habitat would be restored, impacts on vegetation from the proposed dune restoration and enhancement would be long term and beneficial.

11.7.6.7 Wildlife

Affected Resources

Wildlife includes all native and naturalized vertebrate and invertebrate species of animals. This section focuses on common and typical species that have the potential to occur or are known to occur at GSP and the proposed project sites, as well as those of general interest and importance to the ecosystem. Special-status species (or threatened and endangered species) are discussed in more detail in Section 3.2.3. Bird species protected under the Migratory Bird Treaty Act (MBTA) are found at GSP, and are given special consideration under Executive Order 13186, *Responsibilities of Federal Agencies to Protect Migratory Birds.*

GSP provides habitat that supports a variety of wildlife species, including mammals, reptiles, amphibians, birds, fish, and invertebrates. Mammals that would likely be present include species such as opossum, white-tailed deer, squirrels, beaver, and bobcat. Commonly observed reptiles and amphibians include various types of turtles, skinks, snakes, and frogs. Birds include passerines (songbirds), hawks, and shorebirds. Several species of fish such as minnows and sunfish likely inhabit the inland aquatic areas of GSP. Invertebrates would include worms, snails, insects, and crustaceans.

Wildlife species that have been observed or are likely to occur at GSP are presented in tables A1-7 and A1-8 (see attachment A). These tables also indicate whether or not the species might be present within the proposed project areas (special-status species are not included in these tables; they are discussed in Section 3.2.3). Three of the project areas, particularly the proposed sites of the re-established lodge and the research and education facility, likely contain limited wildlife species as the habitat in these areas is primarily packed sand and maintained lawn. The proposed site for the interpretive center is also likely limited in terms of wildlife due to disturbances caused by human presence; the site is adjacent to the existing beach pavilion and SR 182 and contains minimal habitat diversity.

The proposed sites for the new trails likely contain the greatest potential for wildlife species to be present, because these areas are further away from existing development and human presence. The proposed area for dune restoration and enhancement also likely contains wildlife, particularly those species that are adapted to the arid environment typical of this habitat (note: the Alabama beach mouse, a federally listed as endangered species that inhabits the dune areas, is discussed in Section 3.2.3).

Many of the wildlife species, particularly those that are mobile, such as mammals, birds, and some amphibians and reptiles may frequent the proposed project sites, but are not necessarily present at all times. Tables A1-7 and A1-8 (see attachment A) summarize the types of wildlife that could be present at the proposed project sites; however, it should be noted that many of the species are mobile and are likely to be transients, and while they may be present at GSP, they are not necessarily permanently present on the proposed project sites.

Migratory Birds

Migratory birds include not only neo-tropical (long-distance) migrants, but also temperate (short-distance) migrants and resident species (DoD-PIF, 2013). Neo-tropical migratory birds are Western Hemisphere species in which the majority of individuals breed in areas north of the Tropic of Cancer in the spring/early summer and spend the winter in areas south of the Tropic of Cancer. Approximately 200 species of neo-tropical migratory birds are known in the Western Hemisphere. The majority are passerines (songbirds) such as the red-eyed vireo *(Vireo olivaceus)*, hooded warbler *(Setophaga citrine),* American redstart *(Setophaga ruticilla)*, and common yellowthroat *(Geothlypis trichas)* (USFWS, 2004).

The MBTA of 1918 is the primary legislation in the United States protecting migratory birds. The MBTA prohibits taking, killing, or possessing migratory birds unless permitted by regulation. Species protected by the MBTA appear in Title 50, Section 10.13 of the Code of Federal Regulations (50 C.F.R. § 10.13). Most bird species found GSP are covered under the MBTA; species such as European starlings and house sparrows (both invasive species) are not covered.

Numerous species of migratory birds have been observed at GSP over the course of the year. Neo-tropical migratory birds in particular, such as the warblers, use scrub dune habitats and pine woodlands as stopover habitats during spring and fall migrations across the Gulf of Mexico. Up to 48 species may occur in the GSP area, mostly in undeveloped tracts, though the relative abundance of these migrants at individual sites can vary from year to year (USFWS, 2004).

As described previously, the proposed project sites that are most likely to contain the greatest number of wildlife species, including birds, are the proposed sites for the new trails, because these areas are less disturbed by human presence and contain more vegetation. Migratory birds may be present or pass through other proposed project areas, but because of limited habitat diversity, are likely to be fewer in number. Because of their mobility, is it possible that many of the species listed in Table A1-9 (see attachment A) could be present in the proposed project sites at a given time, but would not likely reside there permanently.

Migratory bird species that have been observed at GSP and that may pass through the proposed project areas particularly during migration are shown in Table A1-9 (see attachment A).

Environmental Consequences

Construction

All Project Elements. In general, proposed construction activities may result in temporary, minor, adverse impacts to wildlife species inhabiting the proposed project sites and nearby vicinity. Wildlife residing in the periphery of the proposed construction sites may be temporarily displaced because of noise and construction activities; however, these species would likely relocate to other undeveloped habitat areas of GSP. During construction, some less mobile species including invertebrates (such as ground-dwelling insects) or juveniles (reptiles, fish or invertebrates, for example) within the proposed project sites would likely experience impacts due to direct mortality, but these species would be re-established in the area once construction is complete. The species noted in Tables A1-7 and A1-8 are regularly observed wildlife species at GSP and it is unlikely that there would be adverse impacts to species at the population level nor would the impacts affect the overall prevalence of wildlife at GSP.

Mammals such as white-tailed deer, black bear, and gray fox require relatively large tracts of land for foraging and reproduction. While the proposed construction activities may involve setting up fencing for safety or as a visual barrier around the construction areas, the fencing would not result in fragmented habitat and therefore, construction activities would not interfere with the overall movement of wildlife species at GSP.

There would be adverse, but short-term and minor impacts, to some individual migratory birds during construction, primarily from noise disturbance. Three of the proposed project components (the re-establishment of the lodge and construction of the interpretive center and research and education facility) would occur on disturbed sandy areas or maintained lawn, which do not support many wildlife species. Construction activities during dune restoration and enhancement may temporarily displace birds using those areas, but impacts would be minor and would only displace species that favor shrub-scrub habitat. To the extent possible, visual observation would be used as a technique to document and avoid migratory birds that are potentially nesting and foraging. Construction of the proposed trails

would result in minimal habitat loss during construction, thus there would be minimal impacts to migratory birds using these areas.

Some individual amphibians, reptiles, or fish may be lost due to direct mortality during construction, particularly during construction of the proposed trails that cross aquatic areas, but these species would be re-established in the area once construction is complete. Minimally invasive construction methods would be used when possible, thereby reducing the potential for impacts to aquatic dwelling species. Any in-water work required for construction of footbridges or boardwalks through aquatic areas would be conducted using BMPs to reduce erosion and sedimentation, both of which can have a negative impact on aquatic species. Therefore, impacts to aquatic communities (invertebrates, fish, and amphibians) would be minimized.

The following provides a summary of the site-specific impacts anticipated at each of the proposed project sites. The Alabama beach mouse, a federally listed species with critical habitat designated at GSP, is discussed in greater detail in Section 3.2.3.

Gulf State Park Lodge and Conference Center. The proposed site for the re-establishment of Gulf State Park Lodge and Conference Center primarily contains packed sand with little to no vegetation attractive to wildlife, aside from one scrub dune that would be preserved as part of the proposed site plan. It is possible that mammals such as squirrels, foxes, and coyotes, as well as birds and reptiles could pass through the area, but because of the limited overall habitat availability on the site, it is not likely that any species would be present for long periods of time. Any invertebrates or juvenile species that are present may be permanently lost due to mortality during construction, but impacts to the population level would not be expected because a large amount of undeveloped habitat would remain. Additionally, since this site was formerly developed for use as a lodge, historical natural habitat is limited. The existing scrub dune would be preserved, which would maintain habitat on the site. Therefore, impacts to wildlife from construction at the lodge site would be adverse but short term and minor; although there could be some minor impacts at the individual level these would not impact the overall population of a species.

Interpretive Center. The proposed interpretive center would be built next to the existing beach pavilion on a sandy area with minimal vegetation and habitat. Impacts from construction would be very similar to those described for the re-establishment of the lodge. To the extent practicable, staging areas for construction would occur on areas that are already disturbed, such as the existing parking area for the beach pavilion. The proposed site may be attractive to some species such as birds, some reptiles, small mammals, and small crustaceans that favor sandy areas with grasses and limited diverse vegetation. Overall, the impact to wildlife from construction activities at the interpretive center would be adverse but short term and minor. Impacts at the individual level would be detectable but localized, and would not measurably alter natural conditions. There would be a beneficial impact to wildlife habitat because as part of the proposed site design, scrub habitat would be restored as part of the interpretive outdoor dune restoration and enhancement exhibit.

Research and Education Facility. Construction of the research and education facility would occur in a maintained lawn area next to the existing visitor center, nature center, and Middle Lake. This type of habitat typically only supports species that are readily adapted to low habitat diversity and relatively

urban settings. Mammals, such as squirrels and foxes, as well as urban birds and reptiles may pass through the area but are not likely to remain there for long. Waterfowl, such as ducks and geese, and wading birds, such as herons using Middle Lake, may venture onto the shore and into the proposed project site, but would likely only reside on the lawn for a short time. Alligators have been observed in the vicinity of the site as well, but this species would be avoided during construction to ensure safety of construction personnel. Construction activities would likely affect mobile wildlife and they would relocate to other nearby areas. Some individuals of burrowing species, such as moles, shrews, and ground-dwelling insects, may experience direct mortality, but there would be no impact to overall population levels. To the extent practicable, construction staging areas would be sited in previously disturbed areas, such as the existing parking area for the adjacent visitor center. Therefore, impacts to wildlife from construction of the research and education facility would primarily be adverse but temporary and minor. There could also be minor impacts at the individual level. These impacts would be detectable but localized, and would not measurably alter natural conditions.

Trails. Similar to other components of the proposed project, there would be short-term, minor, and adverse impacts to wildlife during construction of the proposed trails and visitor enhancements. As mentioned above, the proposed locations for the new trails have the greater habitat diversity than other areas affected by the project; therefore, there is the potential for more disruptions to wildlife in those areas, particularly to aquatic-dwellers because portions of the trails would cross aquatic habitats. Small numbers of amphibians, such as frogs, toads, and salamanders; invertebrates; and small fish may be permanently lost during the trail construction process, although some individuals would likely move out of the way. Alligators would be avoided during the construction process to ensure safety of construction personnel. Mammals and birds (migratory and non-migratory) living in the area would also likely relocate during construction due to the noise disturbances caused by construction personnel and equipment. Construction activities would be timed to avoid the nesting seasons of birds. While there may be some impacts at the individual level, overall impacts to wildlife during construction would be adverse but short term and minor because these impacts, while detectable, would be localized and would not measurably alter natural conditions.

Dune Restoration and Enhancement. Construction activities during the proposed dune restoration and enhancement efforts would be minimally invasive, because construction personnel would primarily use hand tools to replant the dune vegetation. Impacts to wildlife using this habitat would primarily result from human disturbance rather than from loss of habitat. Species such as birds, reptiles, and small mammals would likely relocate to other areas during the construction and would be expected to return once the construction activities are completed. During construction, there may be a loss of foraging habitat to species using scrub-shrub habitat during the restoration process because areas could be staked off while the work is occurring, preventing foraging in those areas. However, these impacts would be temporary and minimal. Impacts to wildlife during construction would be adverse but temporary and minor, because these impacts would be detectable but localized and would not measurably alter natural conditions.

Operation

Gulf State Park Lodge and Conference Center. Once the facility is constructed, operation of the re-established lodge would result in increased human presence on the proposed project site; however, this

site was previously developed and supported human activity and this action would not be a new or unprecedented activity in that location. The few wildlife species that likely currently use the area would be permanently displaced, but could easily relocate to surrounding areas. The presence of a permanent structure on the proposed project site rather than an undeveloped piece of land would make the area less attractive for wildlife; however, the dune restoration (discussed below) would provide additional habitat to help mitigate these impacts. The proposed design of the re-established lodge incorporates features to reduce the risk of bird collisions and to limit the disturbance of nocturnal species and other species such as turtles, particularly from lighting. Beneficial impacts would occur from the additional interpretation and educational materials available at the facility that would make visitors more aware of the park's natural resources, and more likely to avoid damage to those resources. Overall, operation of the re-established lodge would result in long-term and adverse, but minor, impacts from human disturbance mitigated by long-term beneficial impacts to wildlife from restoration or enhancement of new dune habitat and design features that reduce the collision risk to birds and disturbance to nocturnal species and turtles.

Interpretive Center. Impacts from operation of the interpretive center would be similar to those described for the re-establishment of the lodge. There would be a long-term and adverse but minor impact to wildlife near the interpretive center from increased human activity, but these impacts would not be expected to adversely affect overall wildlife populations at GSP due to availability of other habitat areas at the park.

Research and Education Facility. Impacts from operation of the research and education facility would be similar to those described for the re-establishment of the lodge. There would be a long-term and adverse but minor impact to wildlife near the research and education facility from increased human activity, but these impacts would not be expected to adversely affect overall wildlife populations at GSP due to availability of other habitat areas at the park, the fact that this site is already developed, and the fact that species in this area have adapted to development. Beneficial impacts would occur from the additional interpretation and educational materials available at the facility that would make visitors more aware of the park's natural resources and more likely to avoid damage to those resources.

Trails. There would be some long-term, minor, and adverse impacts to wildlife after some of the proposed trails are constructed due to increased human activity in areas that were previously undeveloped; however, many of the new trail areas follow previously disturbed corridors, such as utility corridors. Areas where new trails would be constructed would experience an increase in hikers, cyclists, and joggers. While wildlife species might initially be deterred from using the areas surrounding the new trails, they would likely acclimate to the increased human presence and return to the area. There is sufficient undeveloped habitat in GSP to continue to support wildlife populations, so even if species are disturbed and choose not to return to the areas with new trails, there is plenty of other habitat available at GSP. Construction of boardwalks for trails in areas that are currently undeveloped would result in some shading impacts from bridges that cross aquatic habitats. Shading can affect aquatic communities by blocking sunlight that plants and algae need to grow, which may affect food sources for aquatic wildlife such as fish and amphibians. To minimize impacts, raised boardwalks would be constructed and maintained so they do not completely block the sun once they are operational. Therefore, impacts to wildlife in general from operation of the new trails would be long-term, adverse, but minor because

impacts would be detectable but localized, and would not measurably alter natural conditions. Beneficial impacts would occur from the additional interpretation and educational materials available at the facility that would make visitors more aware of the park's natural resources and more likely to avoid damage to those resources.

Dune Restoration and enhancement. Once the proposed dune restoration and enhancement activities are complete, there would be beneficial impacts to wildlife from the creation of approximately 50 acres of enhanced habitat. There would be a noticeable, measurable, beneficial impact to dune habitat on a localized level. It is assumed that the beneficial impacts would be long term, unless an extreme storm event, such as a direct hit from a hurricane, damages the restored dunes in the near term. Dune restoration and enhancement activities would enhance the existing habitat by planting vegetation, providing more stability to the dune system, and allowing the system to gradually restore to pre-Hurricane Ivan conditions. Over time, the area would become more attractive to wildlife and wildlife numbers would likely increase.

11.7.6.8 Threatened and Endangered Species

The Endangered Species Act (ESA) of 1973 and subsequent amendments provide for the conservation of federally listed threatened and endangered animal and plant species and their habitats. The ESA prohibits jeopardizing endangered and threatened species or adversely modifying critical habitats essential to their survival. Section 7 of the Act requires consultation with the National Marine Fisheries Service (NMFS) and the USFWS to determine whether any federally listed endangered or threatened species under their jurisdiction may be affected by a proposed project.

Section 10 of the Endangered Species Act regulates activities which may potentially affect any species of plant or animal designated as threatened or endangered or any habitat upon which they depend. ESA Section 10 prohibits any such activities without a valid incidental take permit (ITP). An ITP is required for any non-Federal activity which may result in take of threatened or endangered species, where "take" is defined as any action which may harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect any threatened or endangered species, and can include any significant habitat modification which may indirectly result in take. An ITP must be accompanied by a habitat conservation plan (HCP), which is designed to ensure that the effects of the authorized incidental take are adequately minimized and mitigated. Since the project area of the proposed Gulf State Park Enhancement Project includes Alabama beach mouse habitat, an ITP and accompanying HCP is required and has been issued by USFWS (Permit no. TE072831).

Alabama does not have a state law equivalent to the federal ESA, so species do not have regulatory protection as state endangered or threatened species. However, some species do receive regulatory protection through the Alabama Regulations on Game and Fish and Fur Bearing Animals published annually (Ala. Adm. Code R. 220-1-1 *et seq*). These are the primary regulations affording state protection for some species in Alabama and are administered by the ADCNR. The Nongame Species Regulation also provides some species protection. The Alabama Natural Heritage Program maintains species inventory lists to help promote state level conservation efforts (Alabama Natural Heritage Program, 2011).

The USFWS issued Incidental Take Permit number TE072831 in 2004 for the work currently proposed at Gulf State Park. The Lodge, Conference Center, Dune Enhancement, and Interpretive Center that are

currently proposed fall within the Action Area of this Incidental Take Permit, The Habitat Conservation Plan, Biological Opinion, and Environmental Assessment that was prepared for issuance of this permit and advertised in the Federal Register on September 14, 2004. The project as proposed further reduces impacts by implementation of environmentally friendly concepts in the development that were not originally proposed in the site plan as permitted in 2004.

Baldwin County is host to several federally listed special-status species, as shown in Table A1-10 (see attachment A). There have been confirmed sightings of several of these species at GSP; however, the majority of the threatened and endangered species listed in Table A1-10 are not found within the proposed project area because the habitat type that supports the species is not present, or the likelihood of the species' prevalence in the county is very low. For these reasons, this section focuses on the species that are most likely to occur in or around the proposed project locations, including:

- Alabama beach mouse and its critical habitat
- sea turtles
- Alabama red bellied turtle
- red knot

A more detailed discussion of these species follows.

Alabama Beach Mouse

The Alabama beach mouse is a federally listed endangered species known to occupy sparsely vegetated areas on the Fort Morgan Peninsula and portions of GSP. This small gray and white mouse with a dark stripe running down the upper surface of its tail is a nocturnal rodent inhabiting burrows in frontal, secondary, and scrub dunes along the Alabama Gulf coast.

In frontal dune areas, Alabama beach mice feed on seeds of sea oats, beach grass, evening primrose *(Oenothera* sp.*)*, ground cherry *(Physalis* sp.*),* saltmeadow cordgrass *(Spartina patens)*, bluestem *(Schizachrium maritimum)*, and panic grass *(Panicum amarum).* Plant species foraged by Alabama beach mice in scrub areas include sand live oak *(Quercus geminate),* bluestem, greenbrier (*Smilax rotundifolia)*, gopher apple *(Licania michauxii),* and jointweed *(Polygonella* spp.*)* (USFWS, 2004).

The Alabama beach mouse was listed as an endangered species by the USFWS in 1985. The mice historically occurred in frontal, secondary, and scrub dunes from Fort Morgan eastward about 32 miles to Ono Island in Perdido Bay. At its time of listing in 1985, the Alabama beach mouse was considered extirpated on Ono Island, but present elsewhere throughout its original range. However, the Alabama beach mouse was only found in small parcels of habitat east of GSP at Romar Beach (USFWS, 2004). At that time, the species was believed to be extirpated from GSP, but critical habitat did still exist at the park. The USFWS reintroduced Alabama beach mouse to GSP, and since that time their population numbers there have rebounded. GSP holds an Incidental Take Permit for anticipated activities associated with the reconstruction of the lodge and its associated components and operates under a Habitat Conservation Plan for the species (see additional discussion under the Environmental Consequences section).

Numerous surveys have documented the presence and relative abundance of Alabama beach mice on the Fort Morgan Peninsula (USFWS, 2004). Relative abundance of the species as surveyed throughout its geographic range, using live trap/capture and release methods, has varied from 1.69 to 61.0 mice per 100 trap-nights. One hundred trap-nights refers to one hundred mousetraps set for one night. However, relative abundance has typically ranged from 3 to 10 mice per 100 trap-night.

Alabama beach mice populations fluctuate within and among sites on a monthly, seasonal, and annual basis. These spatial and temporal differences have been attributed to habitat type, food availability, recruitment following peak reproductive periods, temperature, predation, and storms. Scrub dunes occupied by the mice can function as crucial refuge during severe hurricanes that overwash, flood, and destroy most of the lower frontal and secondary dunes.

Relative abundance of Alabama beach mice in certain types of scrub dunes can be comparable to that within primary and secondary dunes (USFWS, 2004). In coastal environments, the term "scrub dune" refers to habitat or vegetation types where scrub oaks dominate a community adjacent to and landward of secondary/ primary dunes. There is substantial variation in scrub oak density and coverage within and among scrub dunes throughout the geographic range of Alabama beach mice. Such variation, resembling an ecological gradient, is represented by scrub oak woodland with a relatively closed canopy at one end of the continuum and relatively open scrub dunes with patchy scrub ridges and intervening swales or interdunal flats dominated by herbaceous plants at the other end of the gradient. The relative abundance of Alabama beach mice in this open, patchy scrub environment is comparable to that in primary and secondary dunes.

When the Alabama beach mouse was listed in 1985, the USFWS designated critical habitat along 10.6 miles of beaches in Alabama, in three separate blocks, from Fort Morgan eastward to GSP. Critical habitat consists of area that may require special management and is considered essential to the conservation of a species. Critical habitat for the Alabama beach mouse occupies 190 acres at GSP (USFWS, 2004).

The USFWS is required to base critical habitat determinations on the best scientific data available and to focus on those physical and biological features (primary and constituent elements) that are essential to the conservation of the species and that may require special management considerations or protection. Such requirements include, but are not limited to: space for individual and population growth and for normal behavior; food, water, air, light, minerals, or other nutritional or physiological requirements; cover or shelter; sites for breeding, reproduction, rearing of offspring; and habitats that are protected from disturbance or are representative of the historic geographic and ecological distribution of a species. The "constituent elements of critical habitat" for Alabama beach mice known to require special management considerations are dunes and inter-dunal areas, and associated grasses and shrubs that provide food and cover (50 C.F.R. §17.95). Critical habitat for the species includes nearly all dune habitat immediately north and south of SR 182, about 190 acres.

Sea Turtles

Sea turtles that occur in the United States are federally listed as either threatened or endangered. No critical habitat has been established for sea turtles in the United States. While sea turtles have been observed at GSP, they were affected by storm events in 2004 and 2005. Loss of nests occurred and

storm surges may have affected nest viability. In addition, threats to sea turtles at GSP continue from predators (USFWS, 2006).

Green Sea Turtles. The green turtle *(Chelonia mydas)* is circumglobal in tropical and sub-tropical waters. In the continental United States, green turtles occur from Texas to Massachusetts. The Florida breeding population is federally listed as endangered, and elsewhere the species is listed as threatened. Primary nesting beaches in the southeastern United States occur in a six-county area of east-central and southeast Florida where nesting activity ranges from approximately 350 to 2,300 nests annually (USFWS, 2004). Green sea turtles have been observed on the beaches of GSP but only one nest has been recorded between 2003 and 2012 (Ingram, Personal Communication, 2013).

Loggerhead Sea Turtles. The loggerhead turtle *(Caretta caretta)* is listed as a threatened species throughout its range. This species is circumglobal, preferring temperate and tropical waters. In the southeastern United States, 50,000 to 70,000 nests are deposited annually, about 90 percent of which occur in Florida. Most nesting in the Gulf outside of Florida appears to be along the Alabama Gulf coast. Although loggerhead sea turtles are observed offshore the Chandeleur Islands of Louisiana, there has been little documentation of nesting. The loggerhead turtle (northwest Atlantic distinct population segment) is by far the most common sea turtle found along beaches in coastal Alabama (USFWS, 2004). Loggerhead sea turtles have been observed on the beaches of GSP, with an average of four nests a year between 2003 and 2012 (Ingram, Personal Communication, 2013).

Kemp's Ridley Sea Turtles. Kemp's Ridley sea turtle (*Lepidochelys kempii*) is listed as an endangered species throughout its range. Adults are found mainly in the Gulf of Mexico. Immature turtles can be found along the Atlantic coast as far north as Massachusetts and Canada. The species' historic range is tropical and temperate seas in the Atlantic Basin and in the Gulf of Mexico. Nesting occurs primarily in Tamaulipas, Mexico, where virtually the entire population of these turtles nests along about 10 miles of beach. Recent observations at this nesting beach indicate that there was a substantial increase in the number of nesting females using that site during the 2000 nesting season compared to nesting records from 1999. The species occasionally nests in Texas and other southern states, including an occasional nest in North Carolina and Alabama. Kemp's Ridley sea turtles have been observed at GSP. From 2006 to 2010 there were seven confirmed Kemp's Ridley nests along the Alabama coast, but not within GSP (Reetz, Personal Communication, 2013).

Leatherback Sea Turtles. Leatherback sea turtles (*Dermochelys coriacea*) are the largest sea turtles. They are listed as endangered throughout the range. Unlike other sea turtles, leatherbacks are more dependent on prey and reproductive requirements than temperature when it comes to their distribution. Leatherbacks are able to regulate their internal temperature more than the other turtles discussed here; therefore, leatherbacks range from the tropics into cool temperate waters. Leatherback sea turtles occasionally have been observed swimming at GSP. However, no leatherbacks have ever been observed nesting at GSP.

Status of Sea Turtles at Gulf State Park. The USFWS considers beaches within GSP suitable for nesting because they have not been adversely affected by development like Orange Beach and Gulf Shores. Most of these beaches are not illuminated and few recreational visitors use the beaches at night.

Between 2003 and 2012, all nests but one have been loggerhead sea turtles, with an average of four nests per year. In 2012, one green turtle nested at GSP (Ingram, Personal Communication, 2013).

Piping plover

Piping plover (*Charadrius melodus*) in Alabama are limited to a few sites presenting optimal foraging conditions, with birds possibly present from August to May and peak numbers in winter. Most of these sites are in Mobile County. Little Dauphin Island, Pelican Island, and parts of Dauphin Island are traditional wintering sites. Occasionally birds are seen in Baldwin County on the western tip of Fort Morgan Peninsula around washover pools along the shoreline. In 2001, critical wintering habitat was designated in Alabama that encompassed the tidal zones, flats, and associated dune systems of Dauphin Island, Little Dauphin Island, Pelican Island, Isle Aux Herbes, and the western tip of the Fort Morgan Peninsula (U.S. Fish and Wildlife Service 2001). Piping plover have not been observed in Gulf State Park.

Red Knot

The red knot *(Calidris canutus rufa*), a candidate to be federally listed as an endangered species, 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 (USFWS 2013). A very small number of individuals have been observed wintering on the Gulf coast and are observed from October to March (USFWS 2013). Roosting and resting habitat includes areas above the high tide line such as reefs and high sand flats (USFWS 2013). Red knot are not known to occur at GSP.

Alabama Red-Bellied Turtle

The Alabama red-bellied turtle (*Pseudemys alabamensis*) is federally listed as an endangered species. Their range is restricted to the Mobile-Tensaw River Delta in Mobile and Baldwin counties adjacent to Mobile Bay. Systematic sampling of major tributaries in coastal Alabama have shown them to be present in major rivers and tributaries of the Mobile Bay, Bayou La Batre, and Fowl, Dog, Fish, Magnolia, and Bon Secour rivers. Specimens have also been recorded from Daphne and Point Clear, Alabama. While suitable habitat may be present at GSP, there are no known records east of Bon Secour River and the species is unlikely to be present at GSP (Ferraro, Personal Communication, 2013).

Environmental Consequences

The following is a discussion of the potential impacts to threatened and endangered species from construction and operation of the proposed project. Table 11-10 shows the species that have the potential to be affected by the proposed project. Figure 11-21. shows the locations of the proposed project enhancements in relation to designated critical habitat areas. Special-status species identified in the Affected Resources section and not listed here would not be affected by the proposed project and are therefore not discussed. For all species, coordination with the USFWS has been ongoing and will continue to occur throughout the life of project construction. Coordination with the USFWS Alabama Field Office (ALFO) began in April 2013 when a pre-application meeting was held to describe all the proposed elements of the Gulf State Park enhancements. A follow-up meeting was held on site with Bill Lynn of USFWS-ALFO to discuss the existing Habitat Conservation Plan and Incidental Take Permit on

June 24, 2013. A conference call occurred on October 3, 2013 with the DWH ESA Coordinator to discuss project updates, with a follow up call on October 25, 2013 that also included the USFWS-ALFO.

Although suitable habitat for piping plover and red knot exists at Gulf State Park, neither species has been observed at GSP. Therefore, no further analysis of impacts to these species was conducted.

Impacts to all other special-status species are expected to be minor, because impacts would be detectable but small and localized, and would not measurably alter natural conditions. Under the ESA, the anticipated effect is expected to be "may affect, not likely to adversely affect" threatened or endangered species. A trained biologist would be on site where these species are likely to be encountered (at the research and education center and the trails) and would be onsite and would monitor for the presence of the species. Impacts during construction would be adverse, but short-term and minor. No impacts are expected during operation of the proposed project elements because trails would be constructed as raised boardwalks through aquatic areas, so the amount of habitat actually lost would be minimal in comparison to the habitat available, as would disturbance from the use of the new and enhanced trails.

GSP continues to coordinate with the USFWS on the proposed project. GSP has regularly coordinated with the USFWS over the years on issues related to the existing Incidental Take Permit and ongoing Habitat Conservation Plan for the Alabama beach mouse.

Table 11-10. Threatened and Endangered Species potentially affected by the proposed project.

COMMON NAME	SCIENTIFIC NAME	FEDERAL STATUS	POTENTIAL EFFECT
Alabama beach mouse	(*Peromyscus polionotus ammobates)*	Endangered; Critical Habitat	Likely to aversely effect– take is authorized via the HCP and associated ITP.
Loggerhead sea turtle	(*Caretta caretta)*	Threatened	May affect, not likely to adversely affect
Kemp's Ridley sea turtle	(*Lepidochelys kempii)*	Endangered	May affect, not likely to adversely affect
Green sea turtle	(*Chelonia mydas) (*P)	Threatened	May affect, not likely to adversely affect
Leatherback sea turtle	(*Dermochelys coriacea)*	Endangered	May affect, not likely to adversely affect
Alabama Red-Bellied Turtle	(*Pseudemys alabamensis)*	Endangered	No effect
Piping Plover	*Charadrius melodus*	Threatened	Not found in project area, not likely to adversely affect
Red Knot	*Calidris canutus rufa*	Candidate	Not found in project area, not likely to adversely affect

Construction

Gulf State Park Lodge and Conference Center, Dune Restoration and Enhancement, and Interpretive Center—Alabama Beach Mouse. GSP currently operates under an existing Incidental Take Permit and Habitat Conservation Plan for the Alabama beach mouse that was developed in conjunction with prior proposed construction activities in 2004 (USFWS, 2004). The proposed construction activities for the re-

establishment of the lodge and construction of the interpretive center would stay within the footprint covered by the existing Incidental Take Permit, including the proposed dune crossovers that would be constructed as part of the lodge. Conditions in the project area have not changed measurably since the original issuance of the permit and the permit is still valid. Monitoring during construction would ensure that activities remain within the designated footprint so as not to result in a take of the species or to cause accidental harm to any Alabama beach mouse that may be in the vicinity of construction areas. Construction activities would incorporate the conservation measures identified in the Habitat Conservation Plan to ensure that habitat is not inadvertently degraded by the introduction of construction personnel and equipment at the site.

All requirements for construction in the 2003 Habitat Conservation Plan for GSP would be followed, including proper disposal of refuse, installing signage during construction, trapping Alabama beach mouse on the site prior to construction, coordinating with the USFWS if any Alabama beach mice are encountered, implementation of a dune management program, informational signage on the role of the dunes for the Alabama beach mouse, limitations on lighting that illuminates the primary dunes, implementing trapping efforts for predators, and a prohibition on pets in the area.

Construction activities during the proposed dune restoration and enhancement efforts would be minimally invasive because construction personnel would primarily use hand tools to replant the dune vegetation. Trained biologists would be present during the proposed restoration efforts to monitor for the presence of any Alabama beach mice, and all activities would be conducted in accordance to the Habitat Conservation Plan for the species. In a recent meeting with the ADCNR and USFWS (March 2013), it was determined that dune restoration and enhancement activities beyond planting sea oats and installing sand fencing in un-vegetated areas would require coordination with the USFWS and may require modification of the existing Incidental Take Permit. Such activities that may require a modification of the permit include the placement of sand, operation of machinery, or the creation of sand movement corridors within the existing man-made berm. It was agreed that as long as dune restoration and enhancement work avoided a potential take the work may be done without a permit modification. A detailed dune restoration and enhancement plan would be prepared by ADCNR and submitted to the USFWS before any dune restoration work is completed. ADCNR would continue to coordinate with the USFWS to ensure compliance with the ESA and to ensure that any impacts to the Alabama beach mouse during construction would be short term and minor. Consequently, any impacts to Alabama beach mouse during construction would be small and localized and would not measurably alter critical habitat. Therefore, the impacts would be adverse but short term, minor, and consistent with the Incidental Take Permit.

As a result, impacts to the Alabama beach mouse during construction would be expected to be adverse but short-term and minor and the proposed construction activities may affect but are not likely to adversely affect the Alabama beach mouse and its associated critical habitat. Although this project impact threshold conclusion, based on information in Chapter 6, would typically be considered moderate, in this instance these impacts to Alabama beach mice are considered minor due to the following: (1) past beach mouse habitat enhancement through the existing Habitat Conservation Plan; (2) additional habitat enhancement associated with the proposed project would result in improved habitat once construction is completed; and (3) current degraded habitat conditions associated with the

previous facility footprint that provide limited beach mouse constituent habitat elements (i.e., dune and vegetation), therefore, few individuals are likely to occur in the area during construction.

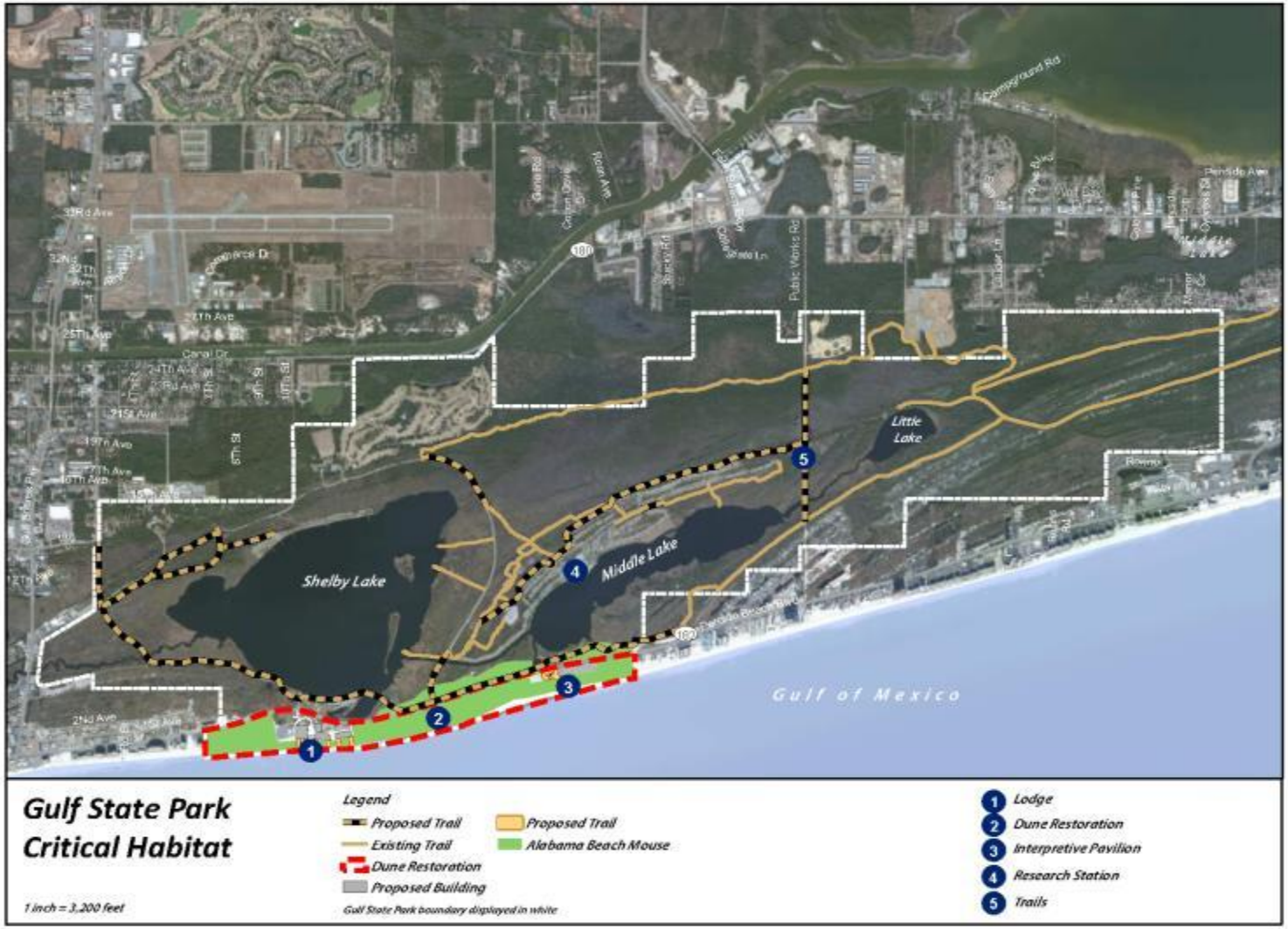


Figure 11-21. Location of Alabama Beach Mouse critical habitat.

Gulf State Park Lodge and Conference Center, Dune Restoration and Enhancement, and Interpretive Center—Sea Turtles. During the 2002 breeding season, a total of five sea turtle nests were discovered along the beach at GSP. The USFWS considers beaches within GSP suitable for nesting because they are not adversely affected by development. Construction activities associated with the lodge re-build and interpretive center would occur north of (behind) the primary dune line. Because no construction or land-disturbing activities would occur in sea turtle nesting habitat, existing turtle nests and possible nesting habitat should not be impacted. Any lighting used during construction would be designed to avoid adverse impacts to sea turtles, such as using lights that reflect inward and away from the beach. To the extent practicable, use of lighting during the nighttime hours would be minimized during construction and would follow all the stipulations set forth in the Habitat Conservation Plan. Therefore, there would be no adverse effect to sea turtles from the re-establishment of the lodge or construction of the interpretive center. The proposed dune restoration and enhancement activities would also not adversely affect sea turtle nesting areas, because turtle nests would be avoided, lights would be designed to minimize impacts, and work would be conducted outside of the nesting season to the extent practicable.

Research and Education Facility. There would be no effect to threatened or endangered species from construction of the proposed research and education facility because there is no suitable habitat for threatened or endangered species in this area. Should a threatened or endangered species be discovered, construction activities would stop, the GSP Natural Resources Program Manager would be alerted, and appropriate consultation with the USFWS would occur.

Trails. Construction of the proposed trails may cross areas containing suitable habitat for the Alabama red-bellied turtle, although the likelihood of encountering this species is very low based on available data on its abundance and distribution and because this species is not known to occur at GSP (Peters, Personal Communication, 2013). During construction, trained biologists would be onsite and would monitor for the presence of the species. Trails would be constructed as raised boardwalks through aquatic areas, so the amount of habitat actually lost would be minimal. Should this species or any other threatened or endangered species be discovered, construction activities would stop, the GSP Natural Resources Program Manager would be contacted, and appropriate consultation with the USFWS would occur. Because of the low probability that the species is present in the park, and because preventive measures would be taken during construction to avoid impacts to the species, construction of the trails is not likely to affect the Alabama red-bellied turtle. As this species in not present in the park and surveys during construction would be conducted, no impacts are anticipated.

Operation

Gulf State Park Lodge and Conference Center, Dune Restoration and Enhancement, and Interpretive Center—Alabama Beach Mouse. Following construction, secondary effects associated with public use of the areas may affect the Alabama beach mouse, due to garbage or refuse that may attract the competitors or predators of the species, and lights that may alter Alabama beach mouse nocturnal behavioral patterns. Once the new facilities are operational, there would be an increase in pedestrian traffic and subsequent beach use in the area, but boardwalks alongside the lodge would safeguard against pedestrian use of the dune system that may cause erosion and loss of habitat for the Alabama beach mouse. Although there would be additional human presence in this area, it would be similar to

levels of activity before the lodge was destroyed. To help minimize impacts to the Alabama beach mouse as a result of the increase in beach use, educational materials concerning the species would be available at the new facilities.

Although no studies have been performed on the impact of artificial illumination on Alabama beach mouse habitat, behavior of the nocturnal mouse could be altered or disturbed by direct and indirect illumination of its habitat. Studies have documented bright moonlight as an inhibitor to Alabama beach mouse activity (USFWS, 2004). Because the lodge lighting design will meet requirements for protection of sea turtles, there is little potential for artificial lighting to impact Alabama beach mouse activity. The lighting systems for the re-establishment of the lodge and construction of the interpretive center would be designed to minimize direct and indirect illumination of Alabama beach mouse habitat. Directed, recessed, and shielded lighting would be used to light only the areas necessary for safe and efficient pedestrian and vehicular traffic and reduce unnecessary illumination of Alabama beach mouse habitat. Techniques to control light overspill and brightness from interior spaces and windows, pedestrian trails, boardwalks, and outdoor areas would include the best available lighting technologies and effective light management programs and systems and all lighting techniques would be in accordance with the Habitat Conservation Plan for the incidental take permit.

Once the dune restoration and enhancement activities are completed, the area should become more attractive to the Alabama beach mouse over time. The quality of existing habitat would be expected to improve and eventually support more Alabama beach mice at GSP. Therefore, there would be a long-term beneficial impact to the Alabama beach mouse from the additional habitat provided by the dune restoration.

Gulf State Park Lodge and Conference Center, Dune Restoration and Enhancement, and Interpretive Center—Sea Turtles. Lighting systems that both directly and indirectly illuminate the beach can adversely impact sea turtles (USFWS, 2004). Sea turtles tend to prefer dark beaches when selecting nest sites; therefore, an artificially illuminated beach can deter sea turtle nesting activity. Further, sea turtle hatchlings that emerge from the nest on an artificially illuminated beach can become disoriented and confused by the unnatural lighting and as a result may not be able to find the water. Hatchlings get disoriented on artificially illuminated beaches because they tend to move in the direction of the brightest light, especially when one light source is much brighter than the others. This condition is often created when improperly designed lighting systems are used. A properly designed lighting system minimizes direct and indirect illumination of the adjacent beach. A well-designed system incorporates the best available lighting technologies along with an effective light management program. Lights simply can be turned off during nesting season, or can be minimized in number and wattage. Recessing the lights or placing them behind structures, shielding the bulbs, lowering the fixtures to illuminate smaller targeted areas, and using timers and motion-detector switches to ensure lights are on only when needed are all effective measures to reduce the illumination of nesting beaches. The lighting systems that would be used for the illumination of the development proposed would be designed to minimize direct and indirect illumination of the beach (USFWS, 2004) and would follow all of the stipulations set forth in the Habitat Conservation Plan. Furthermore, a light management program that requires dimming or totally extinguishing outdoor lighting that affects the beach during sea turtle nesting season would be implemented.

Increased occupancy rates associated with the new facilities would lead to increased pedestrian traffic and subsequent beach use. To help minimize impacts to sea turtles as a result of the increase in beach use, educational materials concerning sea turtles and their nesting behaviors would be available at the new facilities. The materials would describe the turtles' nesting behavior, and state the dates of the nesting season, teach visitors how to recognize a turtle nest, and instruct them to report any turtle nesting activity immediately to park officials. Furthermore, signs and postings near the beaches would alert visitors not to disturb known and marked turtle nests under penalty of law.

Impacts to sea turtles as result of the operation of these elements of the proposed project would be long-term and minor, and the operation of the proposed facilities may affect but would not likely adversely affect sea turtles. Any impacts to sea turtles during operations would be small and localized and would not measurably alter natural conditions; therefore, impacts would be adverse but short term and minor.

Research and Education Facility. There would be no effect on threatened or endangered species from operation of the proposed research and education facility because no ESA species are likely to be present and suitable habitat is not available. Should a threatened or endangered species be discovered, the GSP Natural Resources Program Manager would be contacted, and appropriate consultation with the USFWS would occur. Therefore, there would be no effect on threatened or endangered species from the operation of the research and education facility.

Trails. There would be no effect on threatened or endangered species from operation of the enhanced trails, because there are likely no threatened or endangered species present in these areas. As stated previously, there may be suitable habitat for the Alabama red-bellied turtle in areas where the trails cross aquatic areas; however, the species has not been observed at GSP. Even if the species is present, trails that cross aquatic areas would be raised above the ground so an increase in human presence would not affect any species that could be present. Therefore, there would be no effect on threatened or endangered species from operation of the enhanced trail system.

11.7.6.9 Human Uses and Socioeconomics

11.7.6.9.1 Socioeconomics and Environmental Justice

Affected Resources

This section provides an overview of social and economic characteristics for municipalities located near the proposed project. Study area communities include Gulf Shores, Alabama (the municipality in which the proposed project is located), and Orange Beach, Alabama (the municipality adjacent to and east of Gulf Shores). Because of their proximity to the proposed project, Gulf Shores and Orange Beach are the municipalities that would likely experience the greatest effects from the construction and operation of the proposed project. These municipalities are located in Baldwin County. As a result, social and economic indicators are also presented for Baldwin County to provide context for existing conditions in study area municipalities and to highlight how these conditions are similar or different from the county overall.

It should be noted that other municipalities are located near the proposed project site; however, economic characteristics are not available because of their small size and disclosure issues. Information

presented below has been retrieved from the 2010 decennial Census or 2007-2011 American Community Survey (ACS), both products of the U.S. Census Bureau. Racial and ethnic characteristics are available from the 2010 decennial Census. Economic indicators are presented in 5-year estimates from the ACS. This information is no longer being reported in the decennial Census.

Economic characteristics highlight those sectors that play a large role in the local economy, including accommodation and food services and retail trade. Fisheries and aquaculture generate a considerable amount of economic activity across the Alabama coastal region. However, their consideration is not necessary for this analysis because business activity in these sectors would not be affected by the proposed project.

Racial and Ethnic Characteristics

Gulf Shores and Orange Beach both have a notably higher concentration of residents who identify themselves as White alone than Baldwin County (see Table 11-11). Fewer than 2 percent of residents in either Gulf Shores or Orange Beach identify themselves as Black or African American alone, notably lower than the Baldwin County average. Overall, the composition of all other racial and ethnic groups in study area municipalities is relatively similar. However, the presence of those who identify themselves as Hispanic or of Latino origin in Gulf Shores more closely resembles that of Baldwin County than Orange Beach.

Table 11-11. Racial and Ethnic Composition of study area geographies, 2010.

RACE/ETHNICITY	GEOGRAPHIC AREA		
	GULF SHORES, AL	ORANGE BEACH, AL	BALDWIN COUNTY, ALABAMA
White alone	93.4%	94.3%	85.7%
Non-Hispanic White alone	*97.4%*	*98.9%*	*97.5%*
Hispanic White alone	*2.6%*	*1.1%*	*2.5%*
Black or African American alone	1.5%	0.6%	9.4%
American Indian and Alaska Native alone	0.5%	0.7%	0.7%
Asian alone	0.9%	0.8%	0.7%
Native Hawaiian and Other Pacific Islander alone	0.1%	0.0%	0.0%
Other*	3.5%	3.6%	3.5%
Total	**9,741**	**5,441**	**182,265**
Hispanic or Latino origin	4.0%	2.6%	4.4%
Minority**	9.1%	6.7%	16.5%

Note: *the 'Other' category includes all those who identify themselves as being of 'Some Other Race' or 'Two or More Races'.
**Executive Order 12898, *Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations* defines a minority as any person who identifies themselves as being of a race other than Non-Hispanic White alone.
Source: U.S. Census Bureau, 2013a. SF1 data files.

Economic Characteristics

The retail trade sector employs the greatest number of people in Gulf Shores (see Table 11-12). At 24.3 percent, this is notably higher than in either Orange Beach or Baldwin County overall. The location of Gulf Shores and Orange Beach and the availability of recreational activities help support employment in the arts, entertainment, recreation accommodation, and food services sectors. The retail trade is among

the top three employment sectors in each municipality. Employment in the educational services and health care and social assistance sector is notably higher in Orange Beach and Baldwin County than in Gulf Shores.

The labor force in Gulf Shores is more than twice the size of the labor force in Orange Beach (see Table 11-13). Both municipalities have a higher unemployment rate than that of Baldwin County overall. Baldwin County reports an unemployment rate of approximately 7.7, while Gulf Shores and Orange Beach report 9.2 percent and 10.0 percent, respectively. There is very little military employment in study area communities.

The median household and per capita income in Orange Beach are notably higher than in either Gulf Shores or Baldwin County overall (see Table 11-14). While the median household income in Baldwin County is greater than that of Gulf Shores, the per capita income is lower.

Table 11-12. Employment by industry of study area geographies, 2007-2011.

INDUSTRY	GULF SHORES, AL	ORANGE BEACH, AL	BALDWIN COUNTY, AL
Civilian employed population 16 years and over	4,612	2,202	79,963
Agriculture, forestry, fishing and hunting, and mining	2.2%	0.0%	1.8%
Construction	8.9%	8.9%	9.7%
Manufacturing	1.6%	1.0%	8.7%
Wholesale trade	0.3%	3.8%	3.2%
Retail trade	**24.3%**	**12.7%**	**14.2%**
Transportation and warehousing, and utilities	1.6%	5.5%	5.2%
Information	1.0%	5.9%	1.7%
FIRE*	**13.4%**	10.4%	6.7%
Professional, scientific, and management, and administrative and waste management services	9.4%	5.7%	**10.1%**
Educational services, and health care and social assistance	11.3%	**22.5%**	**19.1%**
Arts, entertainment, and recreation, and accommodation and food services	**18.6%**	**19.0%**	9.9%
Other services, except public administration	4.6%	2.6%	5.0%
Public administration	2.8%	2.0%	4.7%

Note: *FIRE includes the finance, insurance, real estate, and rental and leasing sectors.
**bold indicates the top three industries in each geographic area of comparison.
Source: U.S. Census Bureau, 2013b. 2007-2011 American Community Survey.

Table 11-13. Employment and unemployment characteristics, 2007-2011.

EMPLOYMENT STATUS	GULF SHORES, AL	ORANGE BEACH, AL	BALDWIN COUNTY, AL
In labor force	5,100	2,448	86,890
Civilian labor force	5,077	2,448	86,594
Employed	*90.8%*	*90.0%*	*92.3%*
Unemployed	*9.2%*	*10.0%*	*7.7%*

Armed Forces	23	0	296
Not in labor force	2,615	2,032	55,940
Source: U.S. Census Bureau, 2013b. 2007-2011 American Community Survey.			

Table 11-14. Poverty Status* and earnings for study area geographies, 2007-2011.

INDICATOR	GULF SHORES, AL			ORANGE BEACH, AL			BALDWIN COUNTY, AL		
	TOTAL	BELOW POVERTY LEVEL		TOTAL	BELOW POVERTY LEVEL		TOTAL	BELOW POVERTY LEVEL	
		NUMBER	PERCENT		NUMBER	PERCENT		NUMBER	PERCENT
Population for whom poverty status is determined	9,324	1,423	15.3%	5,328	283	5.3%	177,223	22,095	12.5%
AGE									
Under 18 years	1,942	617	31.8%	991	10	1.0%	41,300	7,740	18.7%
Related children under 18 years	1,918	593	30.9%	991	10	1.0%	41,239	7,679	18.6%
18 to 64 years	5,596	785	14.0%	3,107	229	7.4%	106,341	12,662	11.9%
65 years and over	1,786	21	1.2%	1,230	44	3.6%	29,582	1,693	5.7%
Median Household Income	$47,262			$63,542			$51,321		
Per Capita Income	$29,516			$37,275			$27,217		
Note: *poverty status is determined for the 12 months prior to reporting. Source: U.S. Census Bureau, 2013b. 2007-2011 American Community Survey.									

11.7.6.9.2 Environmental Justice

The environmental setting of a project area can be viewed from both a geographic perspective and a human perspective. The physical environment provides a geographical context for the populations to be evaluated in this Environmental Impact Statement. The human perspective encompasses race, ethnic origin, and economic status of affected groups.

The intent of an environmental justice evaluation under Executive Order 12898, Federal Actions to Address Environmental Justice in Minority and Low Income Populations (1994), is to identify communities and groups that meet environmental justice criteria, and suggest strategies to reduce potential adverse impacts of projects on affected groups.

The purpose of Executive Order 12898 is to identify and address the disproportionate placement of adverse environmental, economic, social, or health impacts from Federal actions and policies on minority and/or low-income communities. This order requires lead agencies to evaluate impacts on minority or low-income populations during preparation of environmental and socioeconomic analyses of projects or programs that are proposed, funded, or licensed by Federal agencies.

In addition to the direction referenced above, Executive Order 12898 includes the following requirements:

- Each Federal agency shall conduct its programs, policies, and activities that substantially affect human health or the environment in a manner that ensures that such programs, policies, and

activities do not have the effect of excluding persons (including populations) from participation in, denying persons (including populations) the benefits of, or subjecting persons (including populations) to discrimination under such programs, policies, and activities, because of their race, color, or national origin.

- Each Federal agency shall work to ensure that public documents, notices, and hearings relating to human health or the environment are concise, understandable, and readily accessible to the public.
- In addition, the presidential memorandum accompanying the executive order states that "(e)ach Federal agency shall analyze the environmental effects, including human health, economic and social effects, of Federal actions, including effects on minority communities and low-income communities, when such analysis is required by the NEPA of 1969."

Two documents provide some measure of guidance to agencies required to implement Executive Order 12898. The first is Environmental Justice Guidance Under the National Environmental Policy Act (December 1997), published by CEQ. The second document, the Final Guidance for Incorporating Environmental Justice Concerns (April 1998) published in the U.S. Environmental Protection Agency's NEPA Compliance Analysis, serves as a guide for incorporating environmental justice goals into preparation of the Environmental Impact Statement under NEPA. These documents provide specific guidelines for assessing environmental justice effects associated with a proposed Federal project.

According to CEQ and U.S. Environmental Protection Agency guidelines established to assist Federal and State agencies, a minority population is present in a project area if (1) the minority population of the affected area exceeds 50 percent, or (2) the minority-population percentage of the affected area is meaningfully greater than the minority-population percentage in the general population or other appropriate unit of geographic analysis. By the same rule, a low-income population exists if the project area consists of 50 percent or more people living below the poverty threshold, as defined by the U.S. Census Bureau, or is meaningfully greater than the poverty percentage of the general population or other appropriate unit of geographic analysis.

The CEQ guidance indicates that when agencies determine whether environmental effects are disproportionately high and adverse, they are to consider whether there is or would be an impact on the natural or physical environment (as defined by NEPA) that would adversely affect a minority population or low-income population.

None of the published guidelines define the term "disproportionately high and adverse," but CEQ includes a nonquantitative definition stating that an effect is disproportionate if it appreciably exceeds the risk or rate to the general population (CEQ 1997).

The following population characteristics are considered in this analysis:

- Race and ethnicity
- Per-capita income as it relates to the poverty level

The relevant demographic data were obtained from the U.S. Census Bureau. Data are presented at the county level to accommodate the geographic size of each portion of the study area.

In this analysis, a county is considered to have a minority population if its nonwhite population is greater than 50 percent or is meaningfully larger than the general (statewide) nonwhite population. Low-income areas are defined as counties in which the percentage of the population below poverty status exceeds 50 percent, or is meaningfully greater than the general population (average statewide poverty level).

To make a finding that disproportionately high and adverse effects would likely fall on minority or low-income populations, three conditions must be met simultaneously:

- There must be a minority or low-income population in the impact zone.
- A high and adverse impact must exist.
- The impact must be disproportionately high and adverse on the minority or low-income population

As demonstrated in Table 11-15, in 2010, the percentage of Baldwin County residents who identify themselves as a race other than non-Hispanic White alone was 16.5 percent. This is notably lower than the state of Alabama average or 50 percent threshold to identify high concentrations of minority residents.

Approximately 12.5 percent of Baldwin County residents report living below the poverty line. This 5.1 percent lower than the state of Alabama average. Median household and per capita incomes are notably higher than the state overall.

Table 11-15. Racial and Ethnic Composition of Baldwin County and the State of Alabama, 2010.

RACE/ETHNICITY	GEOGRAPHIC AREA	
	BALDWIN COUNTY, ALABAMA	STATE OF ALABAMA
White alone	85.7%	68.5%
Non-Hispanic White alone	97.5%	97.8%
Hispanic White alone	2.5%	2.2%
Black or African American alone	9.4%	26.2%
American Indian and Alaska Native alone	0.7%	0.6%
Asian alone	0.7%	1.1%
Native Hawaiian and Other Pacific Islander alone	0.0%	0.1%
Other*	3.5%	3.5%
TOTAL	182,265	4,779,736
Hispanic or Latino origin	4.4%	3.9%
Minority**	16.5%	33.0%

Note: *the 'Other' category includes all those who identify themselves as being of 'Some Other Race' or 'Two or More Races'.
**Executive Order 12898, *Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations* defines a minority as any person who identifies themselves as being of a race other than Non-Hispanic White alone.
Source: U.S. Census Bureau, 2013a. SF1 data files.

Table 11-16. Poverty Status* and earnings for Baldwin County and the State of Alabama, 2007-2011.

INDICATOR	BALDWIN COUNTY, ALABAMA			STATE OF ALABAMA		
	TOTAL	BELOW POVERTY LINE		TOTAL NUMBER	BELOW POVERTY LINE	
		NUMBER	PERCENT		Number	Percent
Population for whom poverty status is determined	177,223	22,095	12.5%	4,631,432	813,385	17.6%
AGE						
Under 18 years	41,300	7,740	18.7%	1,117,857	280,932	25.1%
Related children under 18 years	41,239	7,679	18.6%	1,113,509	276,973	24.9%
18 to 64 years	106,341	12,662	11.9%	2,886,264	462,034	16.0%
65 years and over	29,582	1,693	5.7%	627,311	70,419	11.2%
Median household income	$51,321			$42,934		
Per capita income	$27,217			$23,483		

Note: *poverty status is determined for the 12 months prior to reporting.
Source: U.S. Census Bureau, 2013b. 2007-2011 American Community Survey.

Emergency Services

Park Enforcement Rangers at the park ensure that visitors comply with park regulations and provide assistance in the event of an emergency. Additionally, the cities of Gulf Shores and Orange Beach provide police and fire protection services for residents and visitors. Medical services are available, but larger facilities are located in other parts of Baldwin County. The following provides an overview of emergency service providers in municipalities adjacent to the park.

Police Protection. In Gulf Shores, there are 42 sworn officers and another 15 civilian personnel including detention officers, telecommunicators, and other staff who work for the department (City of Gulf Shores, 2012).

There are 24 patrol officers and 2 shift supervisors in Orange Beach. Other divisions include administration and records, animal control, communications, corrections, investigations, and marine (City of Orange Beach, 2013a).

The 50 deputy sheriff positions of the Uniform Services Command of the Baldwin County Sheriff's Office are primarily assigned to patrol responsibilities. Deputies are deployed to one of four 12-hour rotating shifts, and rotate assignments within eight zoned areas totaling 2,027 square miles. A sergeant and two corporals supervise the squads. Additional units include the Special Operations Unit and Emergency Response Team (Tactical Unit) (Baldwin County, 2010).

Fire Protection. The fire department in Gulf Shores operates three 24-hour shifts with 15 responders per shift who are all firefighter/EMT certified or firefighter/paramedic certified. The department provides a full range of services to residents and visitors; responses are led by six pumpers, two ladder trucks, and a heavy rescue unit. Emergency medical response is made by the nearest advanced life support pumper available. All medical transportation is provided by MEDSTAR, a private ambulance partner. A technical rescue team responds to issues related to hazardous materials, high angle rescue, confined space rescue, and water rescue (City of Gulf Shores, 2013a).

There are four fire stations in Orange Beach located on John Snook Drive, River Road “Ono Island,” Canal Road “East O.B.,” and Canal Road “Bear Point.” Orange Beach Fire/Rescue operates 2 manned stations on a 24/48 schedule with 3 shifts each having 11 firefighters. All manned apparatus are equipped with advanced life support with at least one paramedic assigned at all times. Battalion Chiefs work the same 24/48 schedule as the firefighters they supervise (City of Orange Beach, 2013b).

Medical Services. In addition to medical services that can be administered by police and fire protection service providers, there are four hospitals in Baldwin County. The closest hospital, South Baldwin Regional Medical Center, is located in Foley, Alabama, approximately 11.7 miles and 14.7 miles from Gulf Shores and Orange Beach, respectively (AL HomeTownLocator, 2013). Other hospitals are more than 35 miles from either municipality.

Environmental Consequences

Construction

Construction of the proposed project, particularly the re-establishment of the lodge, would generate temporary jobs throughout the construction period. Workers would be needed to bring materials to the proposed project site and construct the proposed project elements. Construction workers would likely be retained from municipalities near GSP, the larger Mobile area, or locations further away from GSP. This would likely depend on the contractor selected to perform this work. This change in employment would result in increased earnings and wages for people working at the project site. It is anticipated that some of these workers would identify themselves as minority and/or low-income.

Indirectly, these workers would likely spend money in the local economy in the form of overnight stays, meals, and other goods and services. This would be a temporary (duration of the construction period) increase in economic activity; however, increased spending in local markets may notably increase when these activities are ongoing. This would depend on how many people are onsite during a specified period; the largest increase is anticipated when construction activities of the re-establishment of the lodge are ongoing.

Workers retained from the local area would not likely require overnight hotel accommodations and would likely already be spending in the local market for food and other goods and services. However, the increase in employment necessary to support the construction of the proposed project and associated earnings has the potential to result in additional disposal income for some workers, which may benefit local markets. In 2011, average earnings in Baldwin County for people employed in the construction sector were $41,344 (U.S. Department of Commerce, Bureau of Economic Analysis, 2013). For example, during construction, local businesses would likely experience additional sales and earnings.

Preparation of materials that would be used to construct the proposed project elements, such as steel, wood, and concrete, would likely be performed by businesses other than those retained to construct the proposed project elements. This may help support or temporarily induce additional employment at businesses conducting this type of work, resulting in a short-term beneficial impact.

During specified times throughout the construction period, there would be an increase in heavy material haul trucks on affected roadways. These activities are not anticipated to result in road closures or detours. The proposed project sponsor would coordinate with emergency service providers to identify preferred corridors for the movement of construction materials so that there would be no delay in the delivery of services to area residents and visitors. As a result, no adverse impact to emergency service providers is anticipated.

Overall, construction activities associated with the proposed project, particularly the re-establishment of the lodge, would result in short-term, beneficial socioeconomic impacts in the form of construction employment and wages, and increased economic activity in local markets. Some of these beneficial impacts may be experienced by minority and/or low-income populations.

No adverse impacts to nearby communities in the form of neighborhood fragmentation or a change in access to resources would result. Overall, construction impacts are not expected to substantively alter social conditions. Also, the construction of the proposed project is not anticipated to result in costs to the public or particular groups or industries.

The construction of the proposed project is not anticipated to result in adverse impacts to local communities. Additionally, the introduction of temporary employment would result in an increase in earnings for workers and local markets. Because the construction of the proposed project would result in beneficial socioeconomic impacts and the concentration of those who identify themselves as minority and/or low-income is notably lower than the state average, no adverse impacts to these populations are anticipated.

Operation

Elements of the proposed project that would offer visitor services include the re-establishment of the lodge and operation of the interpretive center and the research and education facility. These facilities would require new workers to provide the services they plan to offer. It is anticipated that a portion of these workers would be from communities adjacent to GSP and may include minority and/or low-income populations.

The largest employment generator of the proposed project elements would be the re-establishment of the lodge and conference center. A study conducted in 2001 evaluated the economic potential of a conference center within Gulf State Park. The analysis concluded that economic benefits would result from increased economic activity and taxes. It estimated that additional visitors resulting from the conference center are estimated to spend approximately $261 per day (Strategic Advisory Group, LLC, 2001).

Many people who work in the accommodations sector work on an as needed basis and are not necessarily full time employees. For example, the number of housekeeping staff at any one time is often dependent on occupancy rates; the higher the occupancy the more staff necessary to support daily operational functions. In 2011, average earnings in the accommodation and food services sector in Baldwin County was $20,953 (U.S. Department of Commerce, Bureau of Economic Analysis, 2013). This number would vary based on the type of employment – lodge management, front of the house staff, maintenance, and housekeeping, among others – and hours worked.

The interpretive center and research and education facility would also generate a small amount of new employment. However, given the size and scale of these elements of the proposed project, existing staffing levels at the park might be sufficient to provide the services at these facilities. Should additional external staff be necessary to support these functions, it is not anticipated that their spending patterns would represent a substantial change in economic activity in the local market. However, this would result in increased wages and earnings for these individuals.

The operation of the proposed project is anticipated to result in increased local and regional economic activity. In addition to overnight visitors to the lodge, enhancements at GSP could result in an estimated 5 to 15 percent increase in park visitation above the no action alternative. These visitors would purchase goods and services from both within and outside the park. The following provides an overview of those visitors and their anticipated spending patterns.

Enhancements at GSP are anticipated to result in three primary types of user benefits, as presented below.

New Visits. These visits are expected as a result of the operation of the re-established lodge and other elements of the proposed project. To estimate the number of new park visits associated with the lodge, a 60 percent occupancy rate of the lodge was assumed, consistent with information provided by the local tourism board. The analysis assumes that there would be 1.6 people per night per room (approximately 350 rooms total). This would result in approximately 120,000 new visitor-nights per year at the lodge. It has also been assumed that this number would translate into the same number of visitor-days at the park.

Existing Visitors. Between 2007 and 2009 annual attendance at GSP averaged 2.5 million visitor-days per year. These visitors are expected to have the value of their visits enhanced as a result of the proposed project. Visitation to GSP could increase by an estimated 5 to 15 percent once the proposed project elements are implemented. This is in addition to the new visitation associated with the lodge.

Visits by School Children. New educational opportunities for school children are estimated to result in an increase in visitation of 50 children per day, 5 days per week for 48 weeks per year. This would result in a total of 12,000 student-days per year.

Local businesses would benefit from the increase in visitation to GSP. However, the number and types of businesses that would benefit were not quantified. Generally businesses that benefit from increased visitation to recreational areas are eating establishments, hotel accommodations, and other retailers of goods and services. It is also anticipated that many businesses would be owned and/or employ people from surrounding municipalities, including minority and/or low-income populations, which would help support the local economy. Overall, the anticipated increase in visitation to GSP that would be generated by the operation of proposed project would result in long-term, beneficial impacts to local and regional businesses. The operation of the proposed project is not anticipated to result in adverse impacts to adjacent communities in the form of community fragmentation or change in access to community resources.

The operation of the proposed project is projected to increase annual visitation to GSP as described above. Many of these visitors would likely either stay at the re-established lodge or other lodging within GSP. When the meeting space in the lodge is fully utilized, use of adjacent lodging outside of the lodge would be required. It is also anticipated that some visitors would frequent adjacent municipalities, such as Gulf Shores and Orange Beach, for overnight stays, meals, and other goods and services.

Emergency Services. Operation of the proposed project would not increase risks to public health and safety. However, incidents do occur periodically. It is anticipated that staffing levels for rangers and law enforcement within the park are adequate to appropriately serve the projected increase in visitation. Staffing levels would be evaluated, as necessary. Police, fire, and other emergency services from adjacent municipalities, such as Gulf Shores and Orange Beach, would be able to assist GSP staff should the need arise. Overall, operation of the proposed project is not anticipated to adversely affect the ability of emergency service providers to deliver services, as needed.

11.7.6.9.3 Cultural Resources

The Gulf Coast of Alabama contains many cultural resources including structures and buildings, historic and archaeological sites, sunken vessels, rural and designed landscapes, cemeteries, and other physical remains of the region's heritage. Information on these properties is contained in the National Register of Historic Places, Alabama Register of Landmarks and Heritage, archaeological survey files, and geographic and thematic-based architectural surveys (Alabama Historical Commission, 2008). In Alabama and across the Gulf Coast region, the preservation and maintenance of historic properties and local landmarks provide educational and heritage tourism opportunities for the general public. Consequently, these resources make a substantial contribution to the social and financial well-being of the region's citizens and are worthy of consideration and protection under state and federal law.

Federal actions that have the potential to affect cultural resources are subject to a variety of laws. The National Historic Preservation Act of 1966, as amended (16 U.S.C. § 470(f)) (NHPA) is the principal legislative authority for managing cultural resources associated with federally licensed, funded, or permitted projects.

The NHPA established the National Register of Historic Places (36 C.F.R. § 60[a-f] (National Register), the official list of the nation's historic places worthy of preservation. Administered by the National Park Service (NPS), the National Register is part of a national program to coordinate and support public and private efforts to identify, evaluate, and protect America's historic and archeological resources. The criteria applied to evaluate properties are contained in 36 C.F.R. § 60.4. The quality of significance in American history, architecture, archeology, engineering, and culture is present in districts, sites, buildings, structures, and objects that possess integrity of location, design, setting, materials, workmanship, feeling, and association, and:

- that are associated with events that have made a significant contribution to the broad patterns of our history;
- that are associated with the lives of persons significant in our past;
- that embody the distinctive characteristics of a type, period, or method of construction, or that represent the work of a master, or that possess high artistic values, or that represent a significant and distinguishable entity whose components may lack individual distinction; or
- that have yielded or may be likely to yield, information important in prehistory or history (36 C.F.R. § 60.4).

Cultural resources that meet the eligibility criteria for listing on the National Register are considered "significant" resources and must be taken into consideration during the planning of federal projects. When historically significant resources are found within the Area of Potential Effect of an undertaking, the responsible agency official initiates an assessment of adverse effects (36 C.F.R. § 800.5). The assessment of adverse effects is a consultative process that includes the State/Tribal Historic Preservation Office (SHPO/THPO) and any Indian tribe or Native Hawaiian organization that attaches religious and cultural significance to the eligible resource. This process can lead to avoidance, minimization, and mitigation of effects that are deemed adverse. By doing so, the NHPA and its implementing regulations offer some protection to significant historic properties.

Other important laws or Executive Orders designed to protect cultural resources include, but are not limited to:

- American Indian Religious Freedom Act—to protect and preserve for American Indians access to sites, use and possession of sacred objects, and freedom to worship through ceremonials and traditional rites
- Archeological Resources Protection Act—to secure, for the present and future benefit of the American people, the protection of archeological resources and sites that are on public lands and Indian lands
- Native American Graves Protection Act and Repatriation Act

- Executive Order 11593, *Protection and Enhancement of the Cultural Environment*—to provide leadership in preserving, restoring, and maintaining the historic and cultural environment of the United States
- Executive Order 13007, *Indian Sacred Sites*—to accommodate access to and ceremonial use of Indian sacred sites by Indian religious practitioners and avoid adversely affecting the physical integrity of such sacred sites
- Alabama Underwater Cultural Resources Act (Alabama Code § 41-9-290, *et seq.*)-states that "cultural resources" shall not be taken, damaged, salvaged, excavated, or otherwise altered without a prior contract or permit obtained through the Alabama Historical Commission

Affected Resources

GSP is located within the coastal Alabama. Topographic features within the boundaries of GSP include beach areas fronting the Gulf of Mexico, primary dunes, and a series of east-west oriented Quaternary beach ridges (Nielson, 2002a). Many of these topographic features have been altered by recent hurricanes and subsequent post-storm efforts to restore GSP's protective dune system.

Cultural resources assessments were conducted in 2002 and 2003 on areas within the boundaries of the GSP being considered for development (Nielson 2002a, 2002b, 2002c, and 2002d; Meyer and Meyer 2003). Three of these reports are directly germane to the re-establishment of the lodge, dune enhancements, construction of the interpretive center, and research and education facility elements of the proposed project (Nielson 2002a and 2002b; Meyer and Meyer 2003). They indicate that no archaeological sites, buildings, or structures 50 years or older are present in the areas affected by construction of the lodge and conference center, dune enhancements, and interpretive center (see Table 11-17). Archaeological survey work was conducted in 2003 associated with a proposed campground (Meyer and Meyer, 2003). The location of the campground appears to coincide with that of the proposed research and education facility component of the enhancement project (see Table 11-17).

Table 11-17. Previously recorded cultural resources.

PROPOSED PROJECT ELEMENT	ARCHAEOLOGICAL SITES	BUILDINGS/ STRUCTURES
Lodge and Conference Center	None	None
Dune Restoration and Enhancement	None	None
Interpretive Center	None	None
Research Center	Present	None
Visitor Enhancement\Trails	Present	None
Source: Nielson 2002c, 2002d; and Meyer and Meyer, 2003.		

Current available data on archaeological site locations within the boundaries of the proposed project indicate that 28 archaeological sites are situated within the boundaries of the proposed trails and research and education facility of the proposed project. Almost all of these previously identified sites were recorded in the 1930s by Walter B. Jones of the Alabama Museum of Natural History (Meyer and Meyer 2003). In 2002, Site 1Ba88 was re-located and evaluated during the archaeological survey of the picnic area (Nielson, 2002d). This work resulted in a finding that the site is potentially eligible for the National Register under Criterion D. Phase II testing of this site has been recommended. Archaeological

Sites 1Ba157 and 1Ba161 were relocated and evaluated as part of the campground and access road survey (Meyer and Meyer, 2003). Site 1Ba157 located in the access road was recommended as not eligible for the National Register. Site 1Ba161 was re-located within the boundaries of the campground and by extension the proposed research and education facility. The eligibility status of this site could not be determined because of the presence of an asphalt parking lot (Meyer and Meyer, 2003). For this reason, monitoring of campground construction in the vicinity of the site was recommended if the area could not be avoided. In addition to reviewing these existing studies, a letter was sent to the Alabama SHPO on October 18, 2013, requesting any additional information regarding resources in the proposed project sits. Consultation with the SHPO is ongoing and will be incorporated into the final environmental review.

The reports indicate that the investigated beach front areas were severely impacted by previous hurricanes and storms (Nielson 2002a, b, c, and d). The Alabama Historical Commission, which serves as the State Historic Preservation Officer, (SHPO) reviewed these findings and issued letters of concurrence for each report used in this analysis. The SHPO also concurred with the finding of the campground report, particularly with regard to construction monitoring near Site 1Ba161. Finally, it should be noted that consultation with the SHPO regarding the proposed enhancement Project is on-going.

Environmental Consequences

The analyses of effects on cultural resources in this section respond to the requirements of both NEPA and Section 106 of the NHPA. In accordance with the Advisory Council on Historic Preservation's (ACHP) regulations implementing Section 106 (36 C.F.R. Part 800, *Protection of Historic Properties*), impacts on cultural resources were identified and evaluated by (1) determining the Area of Potential Effect; (2) identifying cultural resources present in the Area of Potential Effect that are either listed in or eligible to be listed in the NRHP (i.e., historic properties); (3) applying the criteria of adverse effect to affected historic properties; and (4) considering ways to avoid, minimize, or mitigate adverse effects.

Agreement on how to mitigate effects on historic properties is reached through consultation with the SHPO, THPO, and ACHP, as necessary. In addition, federal agencies must minimize harm to historic properties that would be adversely affected by a federal undertaking.

The Area of Potential Effect is the geographic area or areas within which an undertaking may directly or indirectly cause alterations in the character or use of historic properties, if any such properties exist (36 C.F.R. § 800.16 (d)). For the purposes of this analysis, the Area of Potential Effect for archaeological sites, buildings, and structures includes the footprint of the five components associated with the proposed project.

Gulf State Park Lodge and Conference Center. The re-established lodge would be located on a formerly developed area where all that is remaining of the previous development is a portion of the building foundation. The structures that formerly existed on the site were destroyed by Hurricane Ivan in 2004. A cultural resources assessment of the area proposed for re-establishing the lodge was conducted in 2002 and no historic properties were identified during the assessment (Nielson, 2002a). The beach front area of the GSP has been impacted by numerous storm and hurricanes. During these events wind and wave action have eroded and re-deposited any archaeological resources located along the beach front. In addition, extensive construction activities associated with the original lodge occurred in the area. These

events have adversely impacted the integrity of any archaeological resources within the foot-print of the proposed facility. It is unlikely that any buried intact archaeological sites, deposits, or artifacts are located in the area where the lodge would be re-established. The lodging facility component of the proposed project would have no effect on historic properties.

Interpretive Center. The proposed interpretive center would be located adjacent to the existing beach pavilion on an open, sandy area that contains some scrubby vegetation and dune grasses. A cultural resources assessment of the area now proposed for the interpretive center was conducted in 2002 (Nielson 2002b). No historic properties were identified during the assessment (Nielson, 2002a). The interpretive center component of the proposed project would have no effect on historic properties.

Research and Education Facility. The proposed site for the research and education facility is located on the west side of Middle Lake, near the existing visitor center and nature center. The site is currently an open, grassy area surrounded by Middle Lake, the existing visitor center, nature center, and associated amphitheater, and a campground further to the southwest. Based on the information available, the proposed facility was surveyed for archaeological sites in 2003 (Meyer and Meyer, 2003). One previously recorded archaeological site was re-located during this survey. The site was covered by an asphalt parking lot at the time of the survey and could not be evaluated for listing in the National Register. Avoidance or monitoring of the site during construction was recommended. This recommendation was accepted by the SHPO. During construction, this area would not be disturbed and all previous SHPO recommendations would be followed. Consultation with the Alabama SHPO has been initiated, and would continue until construction is complete.

Trails. Approximately 13 miles of new and enhanced recreational trails and boardwalks that would connect with the existing trail system are proposed throughout GSP for walkers, runners, cyclists, and other users. Additionally, trails would be built throughout the dune and wetland habitats, along with additional lake amenities and trail signage. A proposed nature center and an existing picnic area were surveyed for historic properties in 2002 (Nielson 2002c and 2002d). Both of these areas are located north of SR 182 with the nature center occupying low terrain south of Middle Lake and the picnic area occupying a series of relic beach ridges and swales south of Lake Shelby.

Archaeologists re-located a large prehistoric shell midden site (1BA88) near the eastern end of the picnic area during the 2002 survey (Nielson, 2002d). This site has been recommended as potentially eligible for the National Register and Phase II archaeological testing has been recommended. This level of work will result in a definitive recommendation regarding the eligibility of the site for the National Register. It is important to note that as presently configured none of the proposed trails or boardwalks encroaches on the picnic area with ground disturbing activities.

In addition to Site 1Ba88, the available archaeological data indicate that 27 other archaeological sites are located within the boundaries of GSP (Nielson, 2002d). Many of these sites are located within the general areas where trails would be constructed or enhanced as a result of the project. However, these locations are not expected to be disturbed during construction or operation.

In addition to these past studies, a Phase I archaeological investigation was conducted along the proposed and existing trail alignments in October 2013. As a result of the archaeological survey, two

isolated artifacts were found and site 1Ba670 was recorded at the eastern end of the proposed Alligator Marsh Extension. The site is a light density scatter of middle Woodland period ceramics situated on a disturbed and eroded upland ridge. 1Ba670 is not considered to be archaeologically significant and does not meet the minimum requirements for nomination to the NRHP. Previously recorded site 1Ba88, located within the Gulf State Park picnic area, is crossed by the proposed Southern Trail. Subsurface testing found intact shell midden and construction activities could impact the site; however, probable design changes and possible capping of the site are currently being assessed in order to minimize any adverse effects to the site. In the event that subsurface disturbance to the site is unavoidable, archaeological monitoring of construction activities would occur. In regard to previously recorded sites 1Ba87 and 1Ba108 that are in close proximity to the path of the proposed Southern Trail, each site was found to be outside of the survey corridor and neither site will be adversely affected by the proposed construction.

Dune Restoration and Enhancement. The dune restoration and enhancement component of the proposed project would involve ecological restoration of approximately 50 acres of dune habitat in the GSP, focusing on the area adjacent to the re-established lodge and immediately west of the existing beach pavilion. Two cultural resource assessments have been conducted within the boundaries of the proposed dune restoration (Nielson, 2002a and 2002b). No historic properties were identified during the two assessments (Nielson, 2002a and 2002b).

The author of the reports reviewed previous research conducted in the GSP and determined that no recorded sites are located south of SR 182 in the vicinity of the lodge and conference center and beach pavilion (Nielson, 2002a and 2002b). This general area coincides with the dune restoration and enhancement element of the proposed project. The results of the cultural resource assessment surveys and literature reviews indicate that no historic properties are located in the area of the proposed dune restoration and enhancement. The dune restoration and enhancement component of the proposed project would have no effect on historic properties.

For all project elements, a complete review of this project under Section 106 of the NHPA would be completed as environmental review continues. This project would be implemented in accordance with all applicable laws and regulations concerning the protection of cultural and historic resources.

11.7.6.9.4 Infrastructure

Utilities

Affected Resources

The City of Gulf Shores provides water and sewer services to GSP. Currently there is a 16-inch water main along the south side of SR 182 extending from Gulf Shores to the western boundary of the park. East from this boundary and extending past the lodge and conference center site to the interpretive center site is a 6-inch main.

A sewer main also extends along SR 182 to these sites, and a sewer main extends to the camping pavilion. The City of Gulf Shores maintains a wastewater treatment plant (WWTP) adjacent to the northern boundary of the park, north of the GSP Golf Course. Wastewater generated by the proposed project would be treated at the Gulf Shores WWTP (Dickson, Personal Communication, 2013, and Wilkins, Personal Communication, letter dated July 30, 2013).

Baldwin EMC, which is a member-owned cooperative supplying electric service to more than 60,000 members throughout Baldwin County and southern Monroe County in southwestern Alabama, supplies electricity to the park and surrounding communities. Its service territory is located between Mobile, Alabama, and Pensacola, Florida, and includes Gulf Shores and Orange Beach. Baldwin EMC maintains electric power lines buried along SR 182 adjacent to the lodge and conference center and interpretive center sites, and additional buried lines to the campground pavilion and the proposed research and education facility.

Riviera Utilities supplies natural gas to GSP and the surrounding area. Riviera Utilities maintains natural gas delivery infrastructure along SR 182 in front of the proposed lodge and conference center and interpretive center sites and provides service to the campground pavilion.

Environmental Consequences

Construction

Construction of the proposed project would generate very little demand on utilities for all project elements. Demand on electricity would be limited to hand tools and other small tools and equipment and is not expected to exceed existing capacity. Power for most construction equipment would be supplied by burning readily available fossil fuel. Water needed for construction processes and for workers' needs would be minimal and is well within the capacity of existing supplies. Sewage generated by construction workers would be treated offsite via "porta-potties." No impacts to utilities due to construction of the proposed project are anticipated because of the minimal demand that would be generated during construction.

Operation

Due to the design and scale of the proposed project, the facilities would place minimal demands on utilities. Re-establishment of the lodge would meet the requirements for certification under an energy efficiency program and incorporate resource conservation features such as recycling and water and energy conservation. These conservation features include reflective surfaces to reduce heat absorption and reduce the amount of energy required for space cooling, use of pervious surfaces to reduce energy

load associated with wastewater treatment, and fixtures that conserve water, such as low-flush toilets and low-flow showers. As mentioned earlier, additional measures include elevators that generate electricity when descending, and high-efficiency HVAC systems and lighting systems.

With implementation of the proposed project, the City of Gulf Shores water and WWTP would experience an increase in demand for water and sewer services. The infrastructure required to convey wastewater for the proposed project is in place and would not require upgrades because the WWTP has excess capacity to treat the expected additional load. According to the planning and project manager at the Gulf Shores Utilities (Wilkins, letter dated July 30, 2013), the additional water and wastewater requirements of the proposed project could be easily met by the municipality (Dickson, Personal Communication, 2013). The increase in demand would not have an impact on the system. While the load would increase, the existing system is in adequate condition and has adequate capacity to handle the increased load. According to the general manager of Gulf Shore Utilities, the WWTP is in compliance with current regulations, and has a current discharge permit (Johnson, Personal Communication, 2013).

An increase in the demand for electricity would also occur with implementation of the proposed project. Baldwin County EMC, the provider of electricity to GSP, would be able to provide the additional electricity needed for project development. Baldwin EMC has indicated that it has 3-phase power available along SR 182 with adequate capacity to serve the project locations and would not require any upgrades to the electrical system. Because transmission infrastructure is already in place, upgrades to the electrical utilities would only consist of connections between the existing transmission lines along SR 182 to the lodge and conference center and interpretive center, and from the existing transmission lines located at the campground pavilion to the research and education facility. The proposed project would affect electric service, but the long-term adverse impact would be localized and within the operational capacities of Baldwin County EMC and would not exceed minor.

The existing 6-inch water main that extends from the western park boundary past the proposed site for the re-establishment of the lodge and on to the proposed interpretive center site would need to be replaced with a 16-inch main to supply sufficient water to the proposed lodge and conference center and interpretive center. Because the system has sufficient capacity for supply and delivery, there would be no impact to water service utilities as a result of the proposed project.

With the exception of insufficient transmission capacity of the water main, utility infrastructure is in place at the facilities' sites, requiring only extending utility transmission lines from the street connections to the facilities.

The proposed project would affect the utility providers, but the adverse impact would be localized and within existing operational capacities. As such, the proposed project is not expected to cause impacts to utilities that would exceed long-term and minor.

Traffic and Transportation

Affected Resources

A traffic impact study for the re-establishment of the lodge was conducted as part of the NEPA planning process for this project. This study, which was prepared for the ADCNR in August 2013, provides an overview of the primary roadways used to access the proposed lodge and conference center site and the level of service (LOS) on those roadways. These roadways also serve as the primary access point to all project elements. This study followed the Alabama Department of Transportation's Access Management Manual, which requires a study area for a large development to include those access points and intersections within a 0.5 mile of extreme access points. Due to the size of this study area, data collected regarding the re-establishment of the lodge is also applicable to all other project elements.

Re-establishment of the lodge and conference center, which would be sited along primary thoroughfares, is anticipated to be the largest traffic generator of the proposed project elements. However, visitors would be expected to travel on secondary roadways to reach their destination should it be located away from primary thoroughfares. The following section provides an overview of the primary roadway network included in the traffic impact study and LOS on those roadways under existing conditions. It also includes a summary of secondary roadways used by visitors to access the different amenities available at GSP.

Roadways

Primary roadways for accessing GSP include SR 182 and 135. On SR 182, the closest intersections to both the eastern and western extremes are more than a 0.5-mile away and therefore not included in this analysis. Additionally, there are two unsignalized intersections just east of the SR 182 and 135 intersection that were previously used to access the old GSP lodge. These intersections have gone largely unused since the old GSP lodge was destroyed by Hurricane Ivan in 2004 and were not included in the analysis. Therefore, only one intersection is included in the study area – the SR 182 and 135 intersection.

State Road 182. This road is an urban principal arterial that provides an east-west connection between the western portion of Gulf Shores and Orange Beach and the Alabama-Florida state line to the east. In the study area, it varies between four and five lanes with two lanes in each direction and a center two-way left turn lane. The turn lane is located near the eastern side of the old GSP lodge site and extends west past the SR 135 intersection. Bike and pedestrian paths are provided on either side of the roadway. The speed limit is 45 miles per hour (mph), and there are good sight lines within the study area. The re-established lodge, interpretive center, and dune restoration and enhancement elements of the proposed project would be accessible by this roadway. Certain parts of the trail system closer to the beach could also be accessed from entry points close to SR 182.

State Road 135. This road serves as a rural major collector providing a north-south connection between SR 182 and Fort Morgan Road (SR 180) and runs through the western portion of GSP. It is a two-lane undivided road in the study area. At the intersection with SR 182, both the southbound and northbound approaches have a dedicated right turn and thru/left shared lane. Similar to SR 182, bike and pedestrian paths are provided; however, road striping and signage demarcate these paths, and there is no physical

separation from the roadway. The speed limit in the study area is 35 mph and there are several horizontal curve warning signs and delineators indicting that sight lines will decrease not far down the road. The proposed site of the re-established lodge is at the southern terminus of SR 135.

State Park Road 2/Fort Morgan Road. This road travels north and west around Lake Shelby from its intersection with SR 182 at the southern terminus to where it meets SR 135 northwest of the lake. This road is used to access the lakeside cabins located on Newberry Drive on the northern shore of the lake. The golf course, also located on the north side of Lake Shelby, is also accessed by this roadway. The proposed research and education facility would be located adjacent to the pavilion and nature center and would be accessed by Campground Road via State Park Road 2. The dune restoration and enhancement element of the proposed project would be located at the southern terminus of this roadway. Various parts of the trail system can be accessed by this roadway.

Campground Road. The campground area is accessed via State Park Road 2 and is located on the west and north side of Middle Lake. Other smaller roads in the campground area such as Quail Road are accessible via Campground Road. The recreational pool is also located in this area. The roadway continues east past Little Lake and Catman Road. The research and education facility and numerous trails would be accessed from this roadway.

Traffic Count Data

Traffic counts were conducted over a 3-day period on June 28, June 29, and July 1, 2013 (Friday, Saturday, and Monday) during both the morning/noon (10:00 A.M. – 2:00 P.M.) and afternoon (4:00 P.M. – 6:00 P.M.) peak periods at the SR 182 and 135 intersection. The weekday morning peak period on June 28th occurred between 12:00 P.M. – 1:00 P.M, while the July 1st morning peak period was between 10:15 A.M. – 11:15 A.M. It is anticipated that the difference between the two peaks periods is attributable to the time at which people have lunch and/or travel to the beach. The peak afternoon travel time was between 5:00 P.M. – 6:00 P.M. and is likely the result of the time people leave work or the beach to return to their lodging for dinner and/or prepare for an evening out in Gulf Shores or Orange Beach.

Saturday traffic counts indicate a morning peak period of 10:15 A.M. – 11:15 A.M. and afternoon peak period of between 5:00 P.M. – 6:00 P.M. It is anticipated that peak travel times during these times is the same for the Friday and Monday traffic volumes.

Traffic counts were not performed for secondary roadways within GSP such as State Park Road 2 and Campground Road. Because these roadways are used to reach specific GSP amenities and are not likely used by many visitors without a specific reason to travel on these corridors (i.e., access the lakeside cabins, campgrounds, or golf course), it is anticipated that the LOS on these roadways is relatively high.

Level of Service

Traffic count data collected over the 3-day period and traffic analysis software designed to calculate delay and generate LOS values based on the principles and procedures set forth in the 2010 Highway Capacity Manual were used to arrive at the values presented in Table 11-18. Information collected during field investigations and traffic counts were used as inputs. As defined in the Highway Capacity Manual, LOS is a measure by which to evaluate the ease at which vehicles are able to travel along

roadways. An LOS A means that traffic is free flowing and motorists are able to travel at or above the posted speed limit and change lanes at will. An LOS F means forced or a breakdown flow of traffic. All motorists are subject to the actions of those in front of them, and frequent slowing is necessary.

As Table 11-18 shows, the LOS on SR 182 during the morning/noon and afternoon peak periods for both weekdays and weekends demonstrates relatively free-flowing vehicular movements. The LOS decreases along SR 135 during the same periods.

The worst LOS is demonstrated at the SR 182 and 135 intersection when traveling north or south on SR 135. As a result, the greatest delays are also reported in this area. At this intersection when traveling on either SR 182 or SR 135, delays are reported to be between 9.6 seconds and 40.5 seconds.

Table 11-18. Delay and level of service on roadways and intersections in the study area.

INTERSECTION/ ROADWAY	APPROACH/ DIRECTION	EXISTING WEEKDAY A.M./NOON PEAK LEVELS OF SERVICE*		EXISTING WEEKDAY P.M. PEAK LEVELS OF SERVICE*	
		DELAY(S)**	APPROACH LOS	DELAY(S)**	APPROACH LOS
SR 182	EB SR 182	N/A	A	N/A	A
	WB SR 182	N/A	A	N/A	B
SR 135	S of SR 182	N/A	N/A	N/A	N/A
	N of SR 182	N/A	E	N/A	E
SR 182 at SR 135 (signalized)	EB SR 182	9.6	A	10.1	B
	WB SR 182	10.6	B	10.8	B
	NB SR 135	31.0	C	31.0	C
	SB SR 135	38.9	D	38.1	D
INTERSECTION/ ROADWAY	APPROACH/ DIRECTION	EXISTING SATURDAY A.M./NOON PEAK LEVELS OF SERVICE		EXISTING SATURDAY P.M. PEAK LEVELS OF SERVICE	
		DELAY(S)**	APPROACH LOS	DELAY(S)**	APPROACH LOS
SR 182	EB SR 182	N/A	B	N/A	A
	WB SR 182	N/A	B	N/A	B
SR 135	S of SR 182	N/A	N/A	N/A	N/A
	N of SR 182	N/A	E	N/A	E
SR 182 at SR 135 (signalized)	EB SR 182	8.4	A	12.1	B
	WB SR 182	11.7	B	12.4	B
	NB SR 135	34.5	C	30.9	C
	SB SR 135	40.3	D	40.5	D

Source: Volkert, 2013b.
Note: *represents an average for Friday and Monday
**in seconds
***The northbound approach of SR 135 originates from GSP and is a relatively short segment with little traffic. Because this segment serves more as a parking lot access road than as an actual roadway segment, it was not analyzed in this report. As a result, LOS values are only given as approach delay for the signalized intersection.

Environmental Consequences

Construction

All Project Elements. Construction activities associated with the re-establishment of the lodge are anticipated to last up to two years. All other project elements would also likely be constructed during this time. The movement of construction equipment and materials has the potential to affect traffic volumes during specified periods. A construction action plan would be developed prior to implementation of the proposed project that would identify the number and type of trucks that would

be moving materials to the site. It would also identify times when material haul trucks would be moving materials to the proposed project site. It is anticipated that the construction action plan would identify off-peak visitation periods and off-peak travel times outside the GSP boundary that are more ideal for moving heavy material haul trucks.

The movement of heavy material haul trucks associated with the construction of the re-established lodge and interpretive pavilion would likely be limited to SR 182 and SR 135 because of their proposed locations. Smaller vehicles, such a pick-up trucks, would likely be used during activities associated with dune restoration and enhancement. Construction activities associated with the proposed research and education facility and trails would include the use of both primary and secondary roadways and would be expected to have relatively short construction times due to the small size of the facilities/improvements.

The construction of the proposed project may have short-term, localized, and minor adverse impacts on traffic patterns because the presence of heavy material haul trucks on affected roadways would likely slow the movement of other roadway users. However, because of current traffic volumes on affected roadways and lane configuration, adverse impacts are more likely to result in an inconvenience to drivers rather than an actual disruption in travel patterns. Because there would be negligible increase in local daily traffic volumes during construction, impacts would be adverse, but short term and minor for all project elements.

Operation

Gulf State Park Lodge and Conference Center. To estimate increased visitation to the proposed project site, new trips were generated using the Institute of Transportation Engineers Trip Generation Manual, 8th Edition. The manual identifies many different land use types and applies a certain number of vehicles to each type. For this analysis, the manual category of “resort hotel” land use type was applied because this established category most closely represents the use that would occur at the lodge and conference center. This land use type was used so that the different elements of the proposed project would be captured in vehicular counts, although this likely represents an overestimate as the “resort hotel” category provided by the manual likely provides a greater level of amenities than are anticipated to be part of this project. Trips were generated for the weekday morning peak period as well as the weekday peak hour of adjacent street traffic. No trip generation data are available for Saturdays so the analysis assumes a 20 percent increase in vehicular volumes over the average weekday peak periods based on similar conditions in the Gulf Shores and Orange Beach areas.

To construct the trip generation model and arrive at outputs, certain assumptions were made. The analysis conducted for the proposed project assumes 100 percent occupancy of the approximately 350 rooms at the lodge. The average trip generation rate per occupied room was used in calculating trips during the weekday peak periods. The same 20 percent increase in vehicular volumes was applied for Saturday peak periods. The analysis assumes one vehicle per occupied room.

The Institute of Transportation Engineers Trip Generation Manual does not currently have a land use type similar in description to the conference space that would be added under the proposed project. As a result, the following assumptions were made regarding this element of the proposed project. The

maximum number of people using the conference center at one time would be 1,500. It is anticipated that a certain percentage of those visitors would be staying at the lodge and therefore reduce the number of vehicles necessary to access the area. For this analysis, it is assumed that 25 percent or 375 meeting attendees would stay on site (possibility of more than one meeting attendee per room) with the remaining 1,125 staying offsite and therefore requiring transportation to and from the area for meetings. Because of the lodge's distance from other overnight accommodations, it has been assumed that no meeting attendees staying offsite would walk or bike to the proposed project site. It was assumed that vehicular occupancy for those accessing the site would be 1.25 people per vehicle. Lastly, it was assumed that during the morning peak period, only inbound trips and afternoon peak period outbound trips would be generated and would coincide with the respective peak periods on SR 182. Using these assumptions, the conference center would generate an additional 810 inbound and outbound trips during the morning and afternoon peak periods.

The proposed project would be accessed via the existing four-way, signalized SR 182 and 135 intersection and a reconfigured T-intersection at SR 182 and the old GSP lodge's east access. At the second location, the re-established lodge would be accessed via SR 182 by a right-in and right-out configuration. SR 182 would need to be widened to accommodate a left-turn lane from westbound SR 182, or an alternative intersection configuration would need to be implemented to support increased access to the lodge.

Projected Traffic Volumes

New trips to the proposed lodge and conference center were generated based on the assumptions identified above coupled with existing traffic patterns, engineering judgment, and other developments in the area. These trips were then distributed (assigned) across the existing roadway network to determine how the proposed project would affect current traffic patterns. In accordance with the Alabama Department of Transportation's Access Management Manual, existing traffic volumes were increased by 1.5 percent to develop baseline future conditions without the proposed project.

Using these baseline conditions, background growth rates, and projected new external trips generated by the proposed project as well as the projected distribution of these trips, future LOS was calculated for existing and proposed intersections in the project area (see Table 11-18 and Table 11-19).

As shown in Table 11-19, the LOS when travelling on SR 182 in both the eastbound and westbound directions during the A.M./noon peak periods would decrease from A to B once the proposed project is in operation. While this would be a decrease in the overall LOS, users would not likely be adversely affected by this change. During the A.M./noon peak period, the delay at most intersections would decrease slightly. The greatest increase in delay would be approximately 12.1 seconds, a difference that users are not anticipated to notice.

During the P.M. peak period, the increase in delay would be less than 3 seconds. Two of the four intersections for which delays were calculated are anticipated to experience a decreased delay period once the proposed project is in operation.

During the Saturday A.M./noon peak period, delays when travelling north and south on SR 135 are projected to decrease under the proposed project. Delays on SR 182 in both the northbound and

southbound directions would increase slightly once the proposed project is in operation. Similar to the A.M./noon peak period, delays when traveling in the northbound and southbound direction on SR 135 would decrease under the proposed project.

Overall, operation of the proposed project would increase traffic volumes in proximity to the re-established lodge and parking areas. However, delays and LOS would not change greatly. As Table 11-18 and Table 11-19 show, delays at the various approaches and intersections in the study area would both decrease and increase under the proposed project. At the various approaches and intersections where the LOS is C, D, or E, operation of the proposed project would either result in an improved or equal LOS as demonstrated under existing conditions. Operation of the proposed project would not result in an LOS of F at any approaches or intersections. The LOS is projected to decrease from A to B or B to C in a limited number of locations in the study area. However, these decreases are relatively small on roadways with unobstructed traffic flow under existing conditions.

Overall, impacts to traffic and transportation as a result of the proposed project would be long term, moderate, and adverse because LOS would stay the same or slightly change for all approaches. While the LOS may change for some approaches, it would still operate at an acceptable LOS (A-E), and no failing LOS would be created from the operation of the lodge. These impacts would be further minimized by implementing mitigation measures such as encouraging ride sharing, working with other lodging establishments to provide shuttle service, establishing check out/check in times to differ from peak traffic times, adoption of specific time-of-day plans for the signal or the installation of an adaptive signal system, among other appropriate traffic mitigation measures.

Interpretive Center, Dune Restoration and Enhancement, Research and Education Facility, and Trails. It is anticipated that some of the visitors included in the projections for the re-established lodge would also frequent other elements of the proposed project. Because the proposed interpretive center and dune restoration and enhancement elements of the proposed project are located near the re-established lodge, visitation induced by these project elements is assumed to be accounted for in projected vehicular volumes and travel patterns, and use of these two elements would not add additional traffic to the area.

Table 11-19. Projected weekday delay and level of service on roadways and intersections in the study area.

INTERSECTION/ ROADWAY	APPROACH/ DIRECTION	EXISTING WEEKDAY A.M./NOON PEAK LEVELS OF SERVICE*		PROJECTED WEEKDAY A.M./NOON PEAK LEVEL OF SERVICE*		DELAY DIFFERENCE (IN SECONDS)	EXISTING WEEKDAY P.M. PEAK LEVELS OF SERVICE*		PROJECTED WEEKDAY P.M. PEAK LEVEL OF SERVICE*		DELAY DIFFERENCE (IN SECONDS)
		DELAY(S)**	LOS	DELAY(S)**	LOS		DELAY(S)**	LOS	DELAY(S)**	LOS	
SR 182	EB SR 182	N/A	A	N/A	B	N/A	N/A	A	N/A	A	N/A
	WB SR 182	N/A	A	N/A	B	N/A	N/A	B	N/A	B	N/A
SR 135	S of SR 182	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
	N of SR 182	N/A	E	N/A	E	N/A	N/A	E	N/A	E	N/A
SR 182 at SR 135 (signalized)	EB SR 182	9.6	A	18.6	B	9.0	10.1	B	12.2	B	2.1
	WB SR 182	10.6	B	14.1	B	3.5	10.8	B	13.3	B	2.5
	NB SR 135	31	C	30.5	C	-0.5	31	C	26.6	C	-4.4
	SB SR 135	38.9	D	51	D	12.1	38.1	D	17.8	C	-20.3
SR 182 at Lodge East Access (unsignalized)	EB SR 182	N/A	N/A	0	A	N/A	N/A	N/A	0	A	N/A
	WB SR 182	N/A	N/A	0	A	N/A	N/A	N/A	0	A	N/A
	NB Lodge Access East	N/A	N/A	18.8	C	N/A	N/A	N/A	23	C	N/A

Source: Volkert, 2013b.
Note: *represents an average for Friday and Monday
**in seconds

Table 11-20. Projected weekend delay and level of service on roadways and intersections in the study area.

Intersection/ Roadway	Approach/ Direction	Existing Saturday A.M./ Noon Peak Levels of Service		Projected Saturday A.M./Noon Peak Level of Service		Delay Difference (in seconds)	Existing Saturday P.M. Peak Levels of Service		Projected Saturday P.M. Peak Level of Service		Delay Difference (in seconds)
		Delay(s)**	LOS	Delay(s)**	LOS		Delay(s)**	LOS	Delay(s)**	LOS	
SR 182	EB SR 182	N/A	B	N/A	C	N/A	N/A	A	N/A	A	N/A
	WB SR 182	N/A	B	N/A	C	N/A	N/A	B	N/A	B	N/A
SR 135	S of SR 182	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
	N of SR 182	N/A	E	N/A	E	N/A	N/A	E	N/A	E	N/A
SR 182 at SR 135 (signalized)	EB SR 182	8.4	A	12.6	B	4.2	12.1	B	19.0	B	6.9
	WB SR 182	11.7	B	12.6	B	0.9	12.4	B	18.9	B	6.5
	NB SR 135	34.5	C	19.5	B	-15	30.9	C	24.2	C	-6.7
	SB SR 135	40.3	D	25.5	C	-14.8	40.5	D	18.3	B	-22.2
SR 182 at Lodge East Access (unsignalized)	EB SR 182	N/A	N/A	0	A	N/A	N/A	N/A	0	A	N/A
	WB SR 182	N/A	N/A	1.1	A	N/A	N/A	N/A	0.6	A	N/A
	NB Lodge Access East	N/A	N/A	24.3	C	N/A	N/A	N/A	38.2	C	N/A

Source: Volkert, 2013b.
Note: *represents an average for Friday and Monday
**in seconds

The proposed research and education facility and trails would be located farther from the re-established lodge and along secondary roadways. It is assumed that there would be 50 children per day visiting the research and education facility. This visitation would introduce an additional one to two school buses per day and would not adversely affect traffic patterns. Introduction of new and enhancement of existing trails would likely attract additional visitors to the area; however, this change is not anticipated to decrease LOS because low traffic volumes on secondary roadways would be able to support this increase. Also, many of these trips would not be new because visitors would already be in the park for another activity such as camping or use of the re-established lodge.

Because existing roadway conditions along primary corridors in the study area operate at relatively high LOS, it is not anticipated that visitation induced by the interpretive center, dune restoration and enhancement, research and education facility, or trails would contribute to a lessening of roadway conditions. Overall, these elements of the proposed project would likely result in a long-term and adverse but minor impact on traffic patterns in the study area because the increase in traffic would be negligible.

11.7.6.9.5 Land and Marine Management

Affected Resources

GSP is situated between the Alabama communities of Orange Beach to the east, Gulf Shores to the west, and the smaller communities of southern Baldwin County to the north. It is just north of the Gulf of Mexico. Land use within the park is predominantly recreation and education and undeveloped marsh land, with recreational trails extending throughout. In addition to water-related uses such as swimming, fishing, and boating at the Gulf shore and in the lakes, there is a golf course at the north edge of the park. Transportation uses include SR 182, which extends parallel to the shore along the landward side of the dune line; SR 135, which cuts through the western end of the park; and smaller roadways to the various park attractions and activities. Parking lots are located near the site of the lodge, interpretive center, and research and education facility. The park lies within Baldwin County Planning District 27, and county zoning has not been instituted in this district.

The area between the re-established lodge and interpretive center sites, and approximately 0.5 mile to the west and east of these facilities contains a recreational beach, with a fishing pier extending approximately 1,000 feet into the Gulf south of the lodge site. Recreational and lodging uses adjacent to the site for the proposed re-establishment of Gulf State Park Lodge and Conference Center are shown in Figure 11-22. Facilities for camping, including RV campers and trailers, are located north and west of the camping pavilion, which is near the proposed research and education facility. In addition, recreational activities, such as tennis and a swimming pool and swimming lake are in the immediate vicinity of the proposed research and education facility.

Figure 11-22. Recreational and lodging uses adjacent to the Gulf State Park lodge and conference Center site.

In addition to dune restoration and enhancement activities along the Gulf shore and the development of recreational trails throughout the park, the proposed project would develop structures at three locations. Two of these locations are on the shore, and one is inland on the northwest side of Middle Lake. Land use along the shore consists of recreational uses, including fishing, swimming, and related activities on the beach, and transportation uses associated with SR 182, approximately 500 to 1,000 feet from the shore. Land use near the proposed research and education facility, on the northwest side of Middle Lake, consists of camping, swimming, fishing, boating, and other recreational uses. Immediately adjacent to the proposed site for the research and education facility is the nature center, classrooms, and an amphitheater.

In the area of the proposed recreational trails, land is predominantly tidal marsh, characterized by marsh vegetation with little development.

The city of Gulf Shores lies adjacent and west of the park, and Orange Beach is adjacent to and east of the park. Orange Beach is a highly developed area of the Alabama Gulf coast and is bisected by SR 182. Along the Gulf shoreline, structures within the city of Orange Beach consist of single- and multi-family dwellings, condominiums, and hotels. Three separate single-family residential areas occupy about a total of 0.8 mile of the Gulf shoreline in Orange Beach. Most of the shoreline in Orange Beach is dominated by high-density condominiums, hotels, and related developments. Most lands along the north side of SR

182 consist of retail stores and restaurants, although scattered undeveloped parcels still exist along the eastern and western city limits. Orange Beach borders the eastern side of GSP.

The city of Gulf Shores, located west of the park, is also a highly developed, rapidly growing, residential area and tourist destination on the Alabama Gulf coast. Housing consists of single- and multi-family dwellings, condominiums, and high and low-rise hotels. One large tract and three smaller lots that front the Gulf along with GSP beaches are devoted to public beach access with most of the remaining coastline dominated by high-density condominiums, hotels, and related developments. The north side of SR 182 in Gulf Shores is highly developed with emphasis on single-family dwellings, retail stores, and restaurants. As a result of the local coastal development, few undeveloped parcels remain within the Gulf Shores city limits.

Environmental Consequences

Construction

All Project Elements During construction, land use at the various sites would be temporarily changed from undeveloped recreational land to a construction zone: land formerly available for recreational use would no longer be available. As a result, construction of the proposed project would result in adverse but short-term and minor impacts to land use. After construction of the project, the construction equipment, building supplies, and construction workers would be removed, and the land would no longer be a construction zone. Changes in land use during construction would be temporary and would not require a zoning change or amendment or affect overall use and management beyond the local area.

Operation

All Project Elements GSP is used primarily as a retreat and recreational area. The majority (more than 98 percent) of the park lands would remain in their current state. The park is public property of the state of Alabama and throughout the years has proven to be a popular tourist destination. Implementation of the proposed project would be consistent with prior usage at GSP, including adding to the interpretation and recreational opportunities that occur throughout the park. Re-establishment of the Gulf State Park Lodge and Conference Center would return land use of the site to its historic use, prior to its destruction by Hurricane Ivan in 2004. Re-establishment of this historic use would also provide additional educational and interpretation opportunities at the park, and be consistent with similar activities at the adjacent pier and beach pavilion. In the area of dune restoration and enhancement, this is beach area and would remain in its current use with no change in land use. Development of the interpretive center would change an approximate 3,500 SF parcel from beach sand to exhibit space. The new facility would share the existing parking lot for the beach pavilion, and this use would be consistent with providing visitor services in this area of the park. Development of the research and education facility would change the existing land use, consisting of a grassy undeveloped parcel, to an educational use. However, it would be consistent with existing uses in the area such as the nature center and adjacent existing classroom. Development of the trails would upgrade existing trails and develop new trails connecting with the larger trail system. Development of the new trails would change the existing land use of

undeveloped marsh and upland areas to a recreational land use for hiking and cycling, but this change would be consistent with the existing trail system.

Operation of the proposed project would generate new visits at the GSP lodge as well as an increase in pedestrian traffic and beach use. These increases are consistent with the intent of the Alabama State Park system, and impacts would not be adverse with visitors experiencing beneficial impacts from the changes in land use that promote additional education and recreational opportunities. The proposed project would not result in substantial new development in the area or prevent development elsewhere. No adverse direct or indirect impacts to land use are anticipated.

Coastal Zone Management

An application for a coastal zone use permit was submitted to the ADEM in June 2013. On August 14, 2013, ADEM provided a non-regulated use permit for the re-established lodge and interpretive center, indicating that the proposed enhancements would be consistent with provisions of the Coastal Zone Management Act. Because all elements of the proposed project are consistent with the Coastal Zone Management Act, no impacts are anticipated, and this topic is not evaluated in detail. In coordination meetings with ADEM it was determined that the trails and research and education facility components were consistent with the CZMA because there would be no impacts to coastal resources. For the trails and research and education facility, impacts to coastal resources are minimal and addressed by a USACE General Permit, which has been certified for use in the coastal zone by ADEM.

11.7.6.9.6 Aesthetics and Visual Resources

Affected Resources

Visual resources are the visible, physical features of a landscape that have an aesthetic value to viewers from viewpoints such as residences, recreational areas, rivers, and highways, among others. Physical features that make up the visible landscape include land, water, vegetation, and human-made features (such as roadways, buildings, and structures), all of which contribute to the overall landscape and visual character of an area. The landscape and visual character help create the overall feel of a site or area. In general terms, the landscape and visual character is like a mental snapshot of a place, and it embodies the defining and most memorable site features.

A view refers to a direct and unobstructed line-of-sight to an on- or off-site aesthetic resource, which may take the form of panoramic viewpoints from particular vantages. Existing views may be obstructed or blocked by modifications to the environment (e.g., grading, landscaping, building construction). Conversely, modifications to the existing environment may create or enhance view opportunities. All land has inherent visual values that warrant different levels of management. Aesthetic judgment, especially related to landscape views, is often considered subjective.

Public views are from vantage points that are publically accessible, such as streets, freeways, parks, and vista points. These views are generally available to a greater number of people than private views. Private views are those that are only available from vantage points on private property. Private views across adjacent land uses are generally not protected unless specifically governed through an adopted general or specific plan, policy, or view preservation ordinance. Therefore, private views are not

considered to be impacted if an adjacent land use blocks such a view, especially if the project is within the zoning and design guidelines designated for the site.

Regulation of visual resources typically occurs through local zoning and planning process and can be enforced by zoning ordinances, building permits, and other regulations governing development. For example, local zoning ordinances may restrict the building height of new construction or limit development densities, both of which would affect the visual environment of an area. Establishment of protected areas (e.g., through conservation easements, trusts, or designating areas as parks or wildlife refuges) can also offer protection of important views and viewsheds. Regulation of visual resources may also occur through the NHPA, which emphasizes protection of visual resources in the context of historic resources and historic viewsheds.

There are no historic properties or historic viewsheds within GSP. GSP is a state property and is therefore not subject to local ordinances. However, the park endeavors to conform to local ordinances to the extent possible. GSP is zoned as an Open Space and Preservation Area in the Gulf Shores Zoning Ordinance (Gulf Shores Zoning Ordinance Map, 2012).

Visual Setting

GSP is situated in southern Baldwin County, Alabama, and is bordered by the Gulf of Mexico to the south, the city of Gulf Shores to the west, the Jack Edwards National Airport to the north, and the city of Orange Beach to the east and north. The southern coast of GSP consists of white sand beaches and dunes that attract a variety of residents and tourists. Unlike heavily developed Orange Beach and Gulf Shores on the eastern and western borders, respectively, GSP is primarily undeveloped except for park/visitor amenities including a fishing pier, beach pavilion, campground, 18-hole golf course, visitor and nature center, cabins, and a series of multi-use trails and boardwalks. The tallest visible structures are the fishing pier and beach pavilion, which are approximately 30 to 35 feet high. GSP is publicly owned land; no private residences or neighborhoods exist within the boundary of the park. The visual setting at each of the proposed project sites is described below.

Gulf State Park Lodge and Conference Center. The site for the proposed re-establishment of the lodge is located on a formerly developed area, and all that is remaining of the previous development is a portion of the building foundation. The structures that formerly existed on the site were destroyed in Hurricane Ivan in 2004. The site currently consists primarily of packed, white sand surrounded by dunes, beach, and the Gulf of Mexico and has building debris scattered on the site. The fishing pier is visible to the west of the site, which extends out into the Gulf of Mexico. Beyond the fishing pier are beach condos several stories high, located outside of the GSP boundary. To the north, a series of zipline towers are visible (the towers are approximately 50 feet high) as shown in photo 1. To the east is a view of the beach and shoreline with the existing beach pavilion visible in the distance, and to the south is the Gulf of Mexico. While the site itself has an open, undeveloped feel (see photo 2), this particular site does not represent the larger visual environment because the areas to the east and west are highly developed. As stated previously, GSP is flanked by the cities of Gulf Shores and Orange Beach, both of which contain hotels, lodges, restaurants, and other structures along the beach. Additionally, the site for the proposed re-establishment of the lodge is located very close to Perdido Beach Boulevard and adjacent to an area of existing development of other tourism uses, as visible in photo 2.

Photo 1. View from pier towards proposed lodge site.

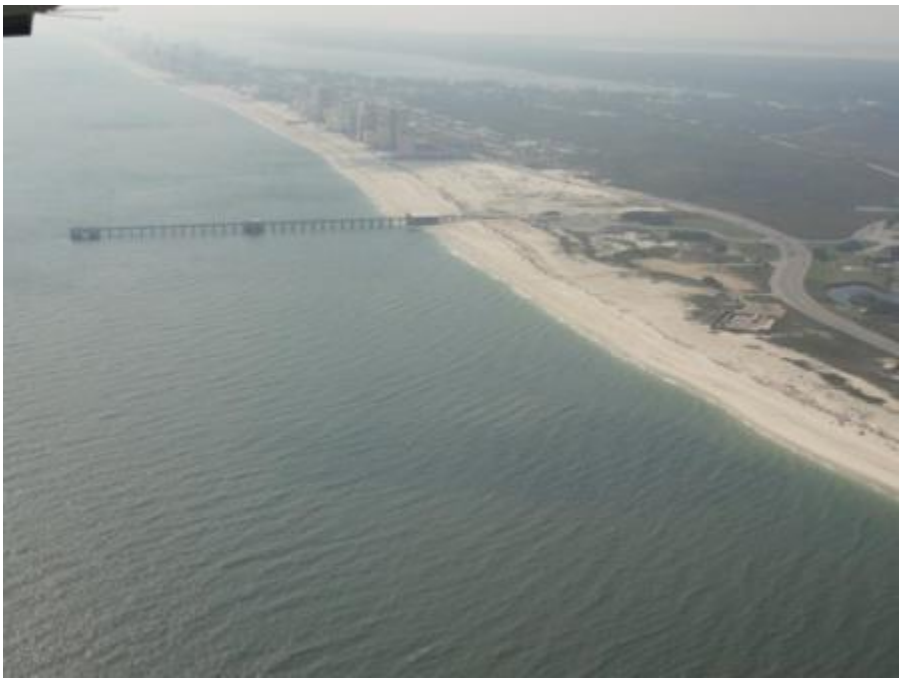


Photo 2. Aerial photo of proposed lodge site.

Interpretive Center. The proposed interpretive center would be located adjacent to the existing beach pavilion on an open, sandy area that contains some dune grasses (see photo 3). Views from this site include the existing beach pavilion and parking lot, SR 182, the fishing pier, and the proposed location for the lodge in the distance to the west, offsite beach condos to the west (see photo 3), and the beach/shoreline and Gulf of Mexico to the south. Conversely, the site is also visible from these locations, although it would only be visible from a distance from the pier and the site for the re-established lodge. The site is only barely visible from the adjacent SR 182 because of the height of the dunes adjacent to the roadway.

Photo 3. Proposed site for interpretive center.

Research and Education Facility. The proposed site for the research and education facility is located on the west side of Middle Lake, near the existing visitor center and nature center. The site is currently an open, grassy area surrounded by Middle Lake, the existing visitor center, nature center, and associated amphitheater (as shown in Photo 4), and an RV park further to the southwest. The RV park is not visible from the site. The landscape character at this site differs from the other sites in that it is an inland site, and dune habitat is not visible.

Photo 4. View towards proposed site for research and education facility, adjacent to existing visitor uses.

Trails. Approximately 13 miles of new and enhanced trails and boardwalks are proposed throughout the park for walkers, runners, cyclists, and other users. Trails also are proposed to be built throughout the dune and wetland habitats, along with additional lake amenities and trail signage, and would connect to GSP's existing trail system. Depending on the location of the trails, the views from the proposed new trails would include wetlands, grassy areas, dunes/beach, Lake Shelby, Middle Lake, Little Lake, and the facilities nearby. The proposed sites for the new trails occur in generally undeveloped areas of GSP and provide unobstructed views of the surrounding natural environment. The proposed sites for the new trails are also visible from facilities such as the cabins near Lake Shelby and Middle Lake, the lodge once it is constructed, the existing beach pavilion, new interpretive center, and possibly from the zipline towers on the south side of Lake Shelby. Photos 5 and 6 show the scenery near the proposed trail sites. Photo 7 shows an existing trail.

Photo 5. Proposed trail site on south side of Lake Shelby.

Photo 6. View near Little Lake and proposed trail site.

Photo 7. View of existing trail.

Dune Restoration and Enhancement. The dune restoration and enhancement component of the proposed project would involve ecological restoration of approximately 50 acres of dune habitat in the park, focusing on the area adjacent to the re-established lodge and immediately west of the existing beach pavilion. The existing dune habitat at the park is located just beyond the beach and shoreline and extends from the east and west boundaries of the park for approximately 1.2 miles. The dunes provide unobstructed views of the Gulf of Mexico to the south, the fishing pier to the west, the beach pavilion to the east, and park land to the north. The dunes are visible from these locations and are also visible from the adjacent SR 182. The dunes contain scrubby vegetation and dune grasses (see photos 8 and 9).

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Photo 8. Dune Habitat, looking away from beach.

Photo 9. Dune Habitat, Looking Away from Beach

Potential Receptors

The existing visual landscape of GSP is primarily a natural environment that is interspersed with park facilities and associated amenities. The majority of the receptors are members of the public (tourists and local residents) visiting the park and employees of the park. Additional receptors include motorists travelling east and west along SR 182; the roadway runs along the south side of GSP and has park land on either side. The only off-site receptors would be inhabitants of the beach condos located slightly west of the western boundary of GSP and any members of the public using the beach in that general area. Table 11-21 summarizes the primary receptors in the vicinity of the proposed project locations.

Table 11-21. Potential receptors.

PROPOSED FACILITY	POTENTIAL RECEPTORS IN THE PROPOSED PROJECT VICINITY
Gulf State Park Lodge and Conference Center	Motorists traveling along SR 182 Recreational users/employees of GSP facilities: • Fishing pier • Beach/shoreline • Zip lines • Cabins along north side of Lake Shelby • Beach pavilion • New interpretive center once constructed (visible from a distance) • New trails Offsite receptors: • Beach condos just outside the western border of GSP • Recreational users of the beach/shoreline west of GSP
Interpretive Center	Motorists traveling along SR 182 Recreational users/employees of GSP facilities: • Lodge once constructed (it will only be visible from a distance) • Beach/shoreline • Beach pavilion
Research and Education Facility	Recreational users/employees of GSP facilities: • Kayakers/boaters in Middle Lake • Visitor center and nature center
Trails	Recreational users/employees of GSP facilities: • Lodge once constructed • New interpretive center once constructed and existing beach pavilion • Zip lines • Existing trails • Beach/shoreline • Cabins near Lake Shelby and Middle Lake
Dune Restoration and Enhancement	Motorists traveling along SR 182 Recreational users/employees of GSP facilities: • Lodge once constructed • Beach pavilion and new interpretive center once constructed • Beach/shoreline • Fishing pier • New trails

Environmental Consequences

Construction

All Project Elements. During construction, there would be adverse, but short-term and minor impacts to visual resources at all of the proposed project sites. The impacts would primarily be due to the presence of construction personnel, equipment (such as fences, stockpiles, etc.), and vehicles and from unfinished buildings or structures visible to the public, employees, and recreational users of GSP facilities. Construction activities at all sites could detract from the overall visual environment at the site, but would be temporary. As the construction of the project elements progresses, the potential impacts would increase in intensity, and additional receptors would be affected as identified in Table 11-21 for all sites. For all construction efforts, impacts could be minimized by a screening or visual barrier to obscure the construction site for the duration of construction. These screens could also be used to educate visitors of GSP and could include information (such as posters or banners) about the flora and fauna of GSP or other issues of interest. Impacts for all elements discussed below would be adverse but short term and minor during construction. Even though there would be some temporary impacts to the existing viewsheds, they would not dominate the view, or detract from current user activities or experiences.

Operation

Gulf State Park Lodge and Conference Center. Implementation of the proposed project would result in a change to the current visual character of the proposed lodge site; however, the proposed development would not introduce an unfamiliar aesthetic because this site formerly contained a building that was destroyed by a hurricane in 2004. The existing site, which primarily consists of packed sand and an old building foundation, would change to a developed area containing the re-established lodge and associated facilities. The presence of a new structure would not be out of character with what the site previously contained. The lodge, at its tallest height, would be approximately 60 feet and would be constructed on approximately 10 acres of the 22-acre total development footprint, a footprint smaller than the original lodge. The existing views that would change the most would be the views from the fishing pier looking east, from the zipline towers looking south, and from the beach looking north. The views of other receptors identified in Table 11-21 would also be affected (cabins along Lake Shelby, users of the beach pavilion/proposed new interpretive center, motorists on SR 182, users of proposed new trails, and offsite receptors), but only in a small way because the lodge would only be visible from a distance or only a portion of it would be visible.

While some visitors may be sensitive to the change in visual environment and consider these impacts adverse, others may find the potential impacts beneficial because the existing site would no longer be an abandoned site and the previous use would be re-established. The lodge facilities would incorporate green design measures into the overall design of the building and include some dune restoration and enhancement activities, which would provide aesthetic improvements to the existing area and education and interpretation opportunities. The proposed re-established lodge would be constructed with appropriate materials and in a muted color scheme that fits in with the overall “beach” feel of the area and other facilities at GSP. Therefore, long term impacts from re-establishment of the lodge would be considered minor, adverse to some visitors but beneficial to others.

Interpretive Center. The proposed interpretive center would be located adjacent to the existing beach pavilion. Even though the existing site is currently undeveloped, the addition of a new structure in this area would not change the overall visual environment in the vicinity of the proposed site. The proposed interpretive center would be approximately 30 to 35 feet tall. The primary receptors that would be affected are recreational users of the adjacent beach/shoreline (views would be obstructed looking north) and individuals using the existing beach pavilion, particularly the observation deck (which is located directly adjacent to the proposed site for the new interpretive center, as shown previously in photo 5). The views of other receptors identified in Table 11-21 would also be affected, but only in a minor way because the proposed interpretive center would only be visible from a distance or only a portion of it would be visible.

While some people may be sensitive to the change in visual environment and consider these impacts adverse, others may find the potential impacts beneficial because the building would be designed in an aesthetically pleasing manner and the new facility would be an extension of the existing beach pavilion facilities. As with re-establishment of the lodge, the proposed interpretive center would be constructed using green design techniques and a muted color scheme that fits in with the overall ambience of the area. Long term impacts from the proposed new interpretive center would be considered minor and adverse to some visitors but beneficial to others.

Research and Education Facility. Implementation of the proposed project would result in a small change to the existing visual environment at the proposed site for the new research and education facility. The existing site, which is currently an undeveloped grassy area adjacent to other visitor use amenities, would change to a developed site containing a structure approximately 25 feet tall. While the actual proposed site for the new facility would change, the overall character of the area would not change greatly because the proposed site is already next to existing development, including the existing visitor center and nature center. The existing views in the proposed project vicinity are primarily trees and parts of Middle Lake; these views would still be visible from the new research and education facility once it is constructed but would likely be obstructed for the receptors on the ground near the visitor center and nature center and boaters/kayakers or swimmers in Middle Lake.

While some people may be sensitive to the change in visual environment and consider these impacts adverse, others may find the potential impacts beneficial because the new building would be designed in an aesthetically pleasing manner. The proposed research center would be constructed using green design techniques and a muted color scheme that fits in with the overall ambience of the area. Impacts from the proposed new research center would be considered long-term minor, adverse, and beneficial because park users would notice the new facilities, slightly detracting from the experience of some while providing a positive element to others.

Trails. Implementation of the proposed project would result in a series of new trails and enhancements to existing trails throughout GSP. Once the new trails are built, there would be a minor change to the visual landscape because areas that are currently undeveloped would now have a series of trails interspersed with the natural environment, which would break up the visual horizon in some areas. New signage would enhance the overall aesthetics of existing trails.

While some people may be sensitive to the change in visual environment and consider these impacts adverse, others may find the potential impacts beneficial. Construction of the trails would enhance viewing opportunities for users by providing access to areas that were previously inaccessible. Similar to the proposed re-establishment of lodge, interpretive center, and research and education facility, boardwalks for new trails would be constructed using green design techniques and a muted color scheme that would fit in with the overall ambience of the area. Long term impacts from the proposed trails would be considered minor and potentially either adverse or beneficial depending upon individual visitor preference--slightly detracting from the experience of some while providing a positive element for others.

Dune Restoration and Enhancement. As demonstrated in Table 11-21, the proposed dune restoration and enhancement area is visible from many different areas in the southern portion of GSP and has the potential to affect several different receptors. Overall, the potential impact would be long-term and beneficial because this component of the proposed project would involve the ecological restoration of approximately 50 acres of dune habitat. The dunes would be planted with native vegetation, which would aesthetically enhance the existing habitat, particularly in areas that have become degraded. It is assumed that the impacts would also be long term; however, this would depend on whether the area experiences any future extreme storm events that could result in erosion of the restored dune areas.

11.7.6.9.7 Tourism and Recreational Use

Affected Resources

Located on Alabama's Gulf coast, GSP comprises 6,150 acres with more than 2 miles of beaches and sand dunes. The white sand beaches are adjacent to turquoise waters found across the state's Gulf Coast. There are numerous opportunities for visitors to enjoy the natural resources present in the area. For example, visitors can enjoy time playing at the beach, fishing, camping, walking, and golfing. Camping and lodging options are also available.

From 2007 through 2009 (before the DWH oil spill), the park managers estimate that annual attendance at GSP averaged 2.5 million visitor days. Overall, it is estimated that Alabama's Gulf coast had approximately 4.6 million visitors in 2009. Table 11-22 provides an overview of activities currently available to visitors at GSP.

Table 11-22. Activities currently available to visitors at Gulf State Park.

VISITOR AMENITY	FUNCTION
Nature Center	This resource features exhibits and animals showcasing wildlife that may be experienced when visiting GSP. Park naturalists provide tours along the backcountry trail and also educate visitors through interpretive programming. Tours are a popular amenity and encouraged during the loggerhead sea turtle nesting season between May and October.
Campgrounds	The campground offers 496 modern campsites with 50-amp service and water and sewer hookups. It can accommodate a range of vehicle sizes from small to large, including recreational vehicles. Bathhouses, a camp store, laundry, and bike rentals are available at this location. Paved roads and pads are available throughout the campground.

VISITOR AMENITY	FUNCTION
Pools and Splash Pad	Located in the campground area, the 5,000 SF swimming pool and splash pad is open seasonally. This location is close to the ocean and has a pool house with restrooms. The camp store is across the parking lot and offers refreshments. Lounge chairs are also available.
Beach Pavilion	The beach pavilion, which opened in 2006, is open to the public during the day and can be rented for private parties and functions at night. It has a large concession stand that is open on a seasonal basis as well as air-conditioned bathrooms with showers that are open year round. Picnic tables are available, and the boardwalk brings visitors to the white sand beach and ocean. The main deck is 48 feet by 87 feet, and the lower deck is 67 feet by 60 feet by 60 feet.
Park Cabins	There are 16 lakeside cabins and four cabins located in the woods. They range in size from one to three bedrooms and have satellite television. The three bedroom cabins have two bathrooms. Two cabins are accessible for persons with limited mobility. Each cabin has screened porches, grills, picnic tables, linens, and full kitchens. Fishing piers with cleaning stations are located nearby.
Lake Cottages	There are 11 lakeside cottages located on the north side of Lake Shelby. Each cottage has three bedrooms, three bathrooms, and shared common areas. Private porches are located off the master bedroom. Each cabin has screened porches, grills, picnic tables, linens, and full kitchens. Fishing piers with cleaning stations are located nearby.
Golf Course	GSP includes an 18-hole, par 72 championship course. Visitors can also enjoy some time at the driving range and rent equipment and a golf cart, as necessary. A pro shop and snack bar are located near the course entry. This amenity is available 7 days a week.
Gulf State Park Pier	The pier is open 24 hours a day, 7 days a week. The pier stretches more than 0.25 mile into the Gulf of Mexico and is a place to enjoy fishing as well as an afternoon walk. In addition to a daily pier permit, a saltwater license is required for ages 16 and above. A nominal fee applies for visitors using the pier for sightseeing. A shop at the head of the pier sells tackle, snacks, and souvenirs. Restrooms and covered seating is available at this location. Additional restrooms and fish cleaning stations are available at the pier's midpoint.

Environmental Consequences

Construction

Gulf State Park Lodge and Conference Center. Because of its size, construction activities associated with re-establishment of the lodge would have the longest duration of any proposed project elements, with construction lasting approximately two years. However, the re-established lodge would be sited in a location that visitors do not currently access on a regular basis because it is behind the dune line separating the project site and the recreational beach uses. For those users who might desire to access the construction site, re-establishment of the lodge on this site would restrict access during construction; however, as previously stated, visitors do not regularly access the site. During construction activities, heavy material haul trucks would access the site, which has the potential to slow traffic patterns in specified areas when such activities are ongoing and may result in some minor delays in visitors accessing their preferred site. A detailed construction action plan would be developed as the proposed project is further refined to minimize potential delays. In addition, it is anticipated that the

movement of heavy material haul trucks would occur during off peak travel times to minimize potential adverse impacts. Construction of the lodge would generate noise and fugitive dust in those areas within proximity to the project site, further discussed under Air Quality. Mitigation measures, such as fencing, that would be implemented to reduce construction noise and fugitive dust would also minimize short-term localized, adverse impacts to visitor use and experience.

It is anticipated that because the project site location is away from areas frequented by many visitors, impacts to visitor use and experience while potentially adverse would be localized, short term and minor during construction because the site would be closed to protect public safety and would be re-opened to visitors after the construction is completed.

Interpretive Center. The proposed interpretive center would be sited adjacent to the existing beach pavilion. Construction activities associated with the interpretive center would include the movement of heavy material haul trucks and increased noise in proximity to the proposed project site. Similar to re-establishment of the lodge, it is anticipated that the movement of heavy material haul trucks would occur during off-peak travel times to minimize adverse impacts. Noise generated when construction activities are ongoing has the potential to adversely affect users of the beach pavilion and boardwalk to the beach. It is anticipated that construction activities at this location would have a relatively short duration because of the size of the proposed structure. Measures to minimize noise impacts and control fugitive dust, such as enclosing loud equipment in sound-reducing materials and spraying any exposed soils or dirt roads with water or biodegradable dust suppression agent, would also reduce adverse impacts. Depending on the final construction action plan, the number of overall parking spaces in this area may be reduced to support the staging of construction equipment. Overall, construction of this element of the proposed project would result in the introduction of construction equipment into the visual environment and limited visitation to the site during construction, as well as increased noise, potentially slowed traffic, and the reduction of parking spaces during construction staging. These impacts would be short-term minor and adverse impacts to visitor use because there would be a short-term closure to protect public safety and the site would be able to be used by visitors after the construction period.

Research and Education Facility. The proposed research and education facility would be located within proximity to the existing nature center and pavilion. Potential visitor impacts would be the same as those described for the interpretive center except visitors to the nature center as well as the beach pavilion may be affected by increased noise and fugitive dust, a temporary reduction in available parking, and a decrease in the visual environment.

Trails. Enhancements to existing and implementation of new trails that connect into and extend the existing trail system would occur in locations currently accessed by visitors to enjoy existing trails. There are numerous existing trails that would not be affected by the proposed enhancements and improvements. As a result, with appropriate signage in place, visitors would be able to avoid areas where construction is ongoing and may be generating noise, fugitive dust, and visual impacts. Enhancements and improvements would not occur in all locations where trails are currently present. As a result, some trails would not be affected by this element of the proposed project and would remain open throughout construction activities. Trails would be (re)opened as new visitor opportunities

become available. Because visitors would still be able to access trails within the park and could therefore avoid areas where construction activities are ongoing, it is anticipated the adverse impacts would be localized, short term and minor.

Dune Restoration and Enhancement. Proposed dune restoration and enhancement would occur over a relatively large area. Materials would need to be trucked to the area to help implement this element of the proposed project. It is anticipated that materials would be brought to the site using smaller equipment such as pick-up trucks. Minimal visual impacts may result from the presence of construction materials. However, dune restoration and enhancement would take place in phases, and visitors would continue to be able to access other areas of the beach where construction activities are not occurring. Appropriate signage would be posted to inform visitors where construction activities are occurring and to indicate other areas of the park that are open for use. Overall, the construction of this element of the proposed project would result in the introduction of construction equipment into the visual environment and limited visitation to the site during construction. Impacts to visitor use would be adverse, but minor and short-term because of the short-term closures to protect public safety. The site would open to visitors after construction.

Operation

All Project Elements. The proposed project is anticipated to generate new visits, enhance existing visits, and increase visits by school children participating in the park's new environmental education program. Individually and collectively the proposed project elements would enhance visitor use and experience and provide increased opportunities for education and interpretation throughout the park as well as replace opportunities that previously existed at the park, such as the lodge and conference center. It is estimated that the re-establishment of the lodge would result in an additional 120,000 visitors annually. Enhanced visitor opportunities as a result of the proposed project elements when considered as a whole could increase visitation by a further 5 percent to 15 percent. Some of the benefits would include new opportunities for workshops and other organized events to be held in a natural environment at the re-established lodge, providing additional education and interpretation opportunities for all project elements, enhanced opportunities to understand the local and regional environment within and surrounding GSP, new recreational amenities, and the provision of new classroom and research facilities. Because of the variety of new and enhanced opportunities provided by each of the elements of the proposed project, it is anticipated that the proposed project would result in long-term beneficial impacts.

11.7.6.9.8 Public Health and Safety and Shoreline Protection

The following provides an overview of potential public health and safety concerns as well as opportunities that may be encountered within GSP by visitors.

Affected Resources

Hazardous Waste Generate or Disposal, or Human Exposure

There are no brownfield, voluntary cleanup, or superfund sites located within GSP (ADEM, 2011; USEPA, 2013).

Impacts to Shoreline Erosion

Gulf coastal Alabama, including Baldwin County, is composed of barrier islands and peninsulas that naturally accrete and entrain sand. Influences such as longshore sediment transport, eolian processes, storm events, seasonal variation, and human activity influence the rates of accretion and entrainment. Sand enters the sediment transport system of waves, winds, and currents. The sand is transported until a reduction of energy allows deposition. When sand is deposited on an area, accretion occurs. Alabama's beaches typically accrete sediment during the summer months and entrain sediment during the winter months. Eroded beach profiles occur in the winter or following storm events and represent beaches with lowered average elevations and decreased slopes along the surf and swash zones. These morphological changes allow periods of winter storm waves to erode sediment from the beach face and to transport sediment to the offshore bar areas. The sediment will move ashore in the spring and summer months when periods of low-energy waves approach the coastline. If the process is allowed to occur naturally, there should be little annual net loss or gain in overall sediment volume over a given area.

The wet beach in the project area has been in an erosional trend for the last several years most likely due to sand trapping resulting from the engineering of the Perdido Pass some 6.9 miles to the east. It is estimated that between 4 and 8 million cubic yards of sand have been trapped immediately on the western side of the Perdido Pass since its construction. This sand trapping has resulted in the “sand starvation” of coastal beaches up to 15 to 20 miles east of the pass. Eroding beaches and “sand starvation” reduce the area that can act as a counter to storm surges, thus forcing storm surge water farther inland. Additionally, decreases in sand content reduce the rate of dune formation which, in turn, also limits the beach’s ability to lessen the effects of storm surges because there are fewer dunes formed.

The highly permeable nature of the majority of the soils within GSP aids in preventing pollutants and sediment-enriched stormwater from reaching the Gulf of Mexico through runoff or via groundwater infiltration. Percolation through the permeable soils also filters pollutants, preventing them from reaching ground water. As a result, soil resources aid in maintaining water quality, which has impacts on human health.

Disease Risk Factors

Access to parks has an impact on public health. Centers for Disease Control data from 2009 indicate that Alabama has experienced increased heart disease death rates since 1999. Incidence of heart disease, diabetes, and obesity in the state of Alabama are each approximately 30 percent, while national incidence rates are closer to 25 percent. Compared to the nation as a whole, Alabama has a higher prevalence of the risk factors for heart disease and stroke. One of the causes includes physical inactivity. Almost a quarter of the adult population of the United States reported getting no leisure-time physical activity during the previous month. In Alabama, the number of inactive adults is approximately 30 percent. The chance of developing heart disease is 1.5 to 2.5 times higher among those who are physically inactive compared to those who are physically active (Williams et al., 2010). Exercise reduces the development of high blood pressure, controls diabetes, lowers weight, and decreases high blood cholesterol. Several studies have established linkages between park use and the reduction of risk factors

for disease. By providing opportunities for physical activity, parks provide health benefits, including a lower risk of obesity, heart disease, and diabetes. Access to nature-based recreation opportunities also offers psychological health benefits including the reduction of stress and depression, reduced aggression and improved socialization (Bedimo-Rung et al., 2005).

Currently, GSP hosts approximately 2.5 million visitors annually at the campsite, cottages, and cabins. Visitors are able to participate in sustained moderate physical activity during multi-day stays using the lakes and trails and active recreation features such as the fishing piers, swimming pool, and zipline.

Environmental Consequences

Construction

Hazardous Waste Generation or Disposal, or Human Exposure. During construction of the proposed project elements, workers would follow standard safety measures in accordance with Occupational Safety and Health Administration regulations; these measures are further outlined in the construction action plan. While there are no known hazardous or contaminated sites located within proximity to the proposed project, the construction action plan would identify measures to be followed should such sites be revealed during construction activities. The construction action plan would identify measures to contain and/or remove materials in a way that would not result in adverse impacts to construction workers, visitors, or resources present in the area, including water sources. Overall, construction of the proposed project elements is not anticipated to result in adverse impacts to public health and safety should identified safety protocols be enforced when such activities are ongoing.

Disease Risk Factors. During construction activities, visitors would still be able to engage in recreational activities at various locations throughout GSP. Some trails would experience temporary closure while enhancements are ongoing; however, other trails within the existing network would be available to visitors. As a result, it is not anticipated that adverse effects would result.

Impacts to Shoreline Erosion

Gulf State Park Lodge and Conference Center, Interpretive Center, Research and Education Facility, and Trails. As mentioned in section 3.1.22, Construction (Water Quality), construction of the lodge, interpretive center, research and education facility, and trails would require a NPDES permit to ensure that measures are taken to maintain the quality of water discharged from the construction site. This would ensure that adjacent waters such as lakes, wetlands, and other water bodies do not receive an excessive amount of pollution thereby changing their water quality status. Additionally, during construction activities the contractor would prepare and E&S plan and employ BMPs to ensure that soil erosion does not occur. After final grading, bare areas would be replanted to further ensure that loose soil does not erode from the area. These elements of the proposed project would result in small, localized changes to water quality, but would become undetectable quickly after construction is complete. State water quality standards regarding drinking water and primary and secondary interactions would not be exceeded. There would be no increased risk of exposure to potential hazards from construction of these elements of the proposed project. Because construction of these elements of the proposed project would not cause soil, groundwater, and/or surface contamination; exeedences in

state water quality standards; and erosion of soil material would be minimized, impacts from construction on public health would be short term minor and adverse.

Dune Restoration and Enhancement. Dune restoration and enhancement activities include planting vegetation in the existing dune systems; placing silt fence around areas to help sand to accrete; and movement of material with small, low-impact construction equipment. BMPs would be employed to ensure that sand does not erode form the beach area during construction. Because construction activities associated with this element of the proposed project would use BMPs to minimize sand erosion and dune deterioration, which would maintain existing protection from storm surges, there are no anticipated impacts to public safety from the proposed dune restoration and enhancement.

Operation

Hazardous Waste Generate or Disposal, or Human Exposure. Because there are no known hazardous or contaminated sites within GSP, the operation of the proposed project is not anticipated to result in adverse effects to public health and safety.

Disease Risk Factors. Improvements at GSP, anticipated to result in an increase in park visitation, , would provide opportunities for increased access to intact natural systems with moderate positive public health impacts associated with nature-based recreation activities. Enhancements associated with the proposed project would provide the benefits of nature-based recreation to those who lack daily opportunities for outdoor exercise, which has demonstrated to have positive effects on stress levels, aggression, and socialization. Lack of access is correlated with increased incidence of obesity, diabetes, and heart disease. (Bedimo-Rung et al 2005). The re-establishment of the lodge would offer opportunities for meaningful, multi-day park visits and the health benefits provided by nature-based recreation to a wider spectrum of the population than is currently served by local lodging options.

Impacts to Shoreline Erosion

Gulf State Park Lodge and Conference Center, Interpretive Center, Research and Education Facility, and Trails. Because each of these operations would be maintained so that soil erosion is minimized through BMPs, there are no anticipated adverse impacts from erosion or soil degradation on public health and safety from these elements of the proposed project.

Dune Restoration and Enhancement. After the initial construction activities, which would reinforce the existing dunes and provide a baseline for which additional dunes would form, the dunes would continue to be restored through natural processes. A restored and more dynamic dune system would decrease the rate of sand loss by capturing it in the dune system, which would help decrease the rate of shoreline erosion. Additionally, a larger dune system would increase the beach's ability to reduce the energy from storm surges and subsequently decreasing the damage that the surges would produce. Because continued restoration of the dunes would act to slow the rate of beach erosion and minimize damage from strong storm surges, this element of the proposed project would result in long-term beneficial impacts.

11.7.7 Summary and Next Steps

Per the Purpose and Need of the Draft Phase III ERP/PEIS, four alternatives are considered, including a no action (Alternative 1), selection of project types emphasizing habitat and living coastal and marine resources (Alternative 2), project types emphasizing recreational opportunities (Alternative 3), or a combination of both habitat and living coastal and marine resources and recreational opportunities (Alternative 4). As proposed, the Gulf State Park Enhancement Project implements recreational and access enhancements within Alternatives 3 and 4.

The proposed Gulf State Park Enhancement Project would include improvements designed to enhance access and improve visitor experience, restore degraded ecosystems, and provide an expansion of the park's environmental education programs to further tell the story of the diverse ecosystem found at GSP. The project is consistent with Alternative 3 (Contribute to Providing and Enhancing Recreational Opportunities) and Alternative 4 (Preferred Alternative).

Draft NEPA analysis of the environmental consequences suggests that while minor adverse impacts to some resource categories may occur, no major adverse impacts are anticipated to result. The potential for moderate adverse impacts was identified for traffic and transportation related impacts; however, mitigation measures would be implemented to reduce these impacts to a minor level. No other resources were identified as having potential moderate impacts. The project would provide long-term benefits by providing increased recreational and interpretive opportunities within GSP, as well as implementing additional dune restoration and enhancement within the park. The Trustees have started coordination and reviews under the Endangered Species Act, the Magnuson-Stevens Fishery Conservation and Management Act, the National Historic Preservation Act, the Marine Mammal Protection Act, the Bald and Golden Eagle Protection Act, Coastal Zone Management Act, and other applicable federal statutes. The Trustees will consider public comment and information relevant to environmental concerns bearing on the proposed actions or their impacts. Final determination on this project will be included in the final Phase III ERP/PEIS and Record of Decision.

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ATTACHMENT 1

Table A1-1. Observed Plant Species in the Maritime Forests in Gulf State Park.

COMMON NAME	SCIENTIFIC NAME		COMMON NAME	SCIENTIFIC NAME
American Holly	*Ilex opaca*		Pignut Hickory	*Carya glabra*
Asters	*Aster sp*		Pink Purslane	*Portulaca pilosa*
Beautyberry	*Callicarpa americana*		Poison Ivy	*Toxicodendron radicans*
Black Titi	*Cliftonia monophylla*		Post Oak	*Quercus stellata*
Blackberry	*Rubus betufolius*		Purple Loosestrife	*Lythrum lineare*
Blazing Star	*Liatris graminifolia*		Red Bay	*Persea borbonia*
Blueberry	*Vaccinium* sp.		Red Maple	*Acer rubrum*
Blue Curls	*Trichostema dichotomum*		Resurrection Fern	*Polypodium polypodioides*
Carolina Jessamine	*Glesemium sempervirens*		Sand Live Oak	*Quercus geminata*
Chokeberry	*Aronia arbutifolia*		Saw Palmetto	*Serenoa repens*
Common Nightshade	*Solanum americanum*		Scarlet Basil	*Calamintha coccinea*
Coral Bean	*Erythrina herbacea*		Serviceberry	*Amelanchier arborea*
Coreopsis	*Coreopsis tinctoria*		Shumard Oak	*Quercus shumardii*
Corn Speedwell	*Veronica arvensis*		Slash Pine	*Pinus elliotti*
Cross Vine	*Bignonia capreolata*		Slender Corydalis	*Corydalis micrantha*
Dahoon Holly	*Ilex cassine*		Green Brier	*Smilax sp*
Devil's Walking Stick	*Aralia spinosa*		Southern Dewberry	*Rubus trivialis*
Dog Fennel	*Eupatorium capillifolium*		Southern Magnolia	*Magnolia grandiflora*
Dwarf Huckleberry	*Gaylussacia dumosa*		Spanish Bayonet	*Yucca gloriosa*
Gallberry	*Ilex glabra*		Spanish Moss	*Tillandsia usneoides*
Goldenrod	*Solidago* sp.		Sparkleberry	*Vaccineum arboreum*
Gopher Apple	*Licania michauxii*		Spring Lady's Tresses	*Spiranthes vernalis*
Henbit	*Lamium amplexicaule*		St. John's Wort	*Hepericum sp.*
Lantana	*Lantana camara*		Stinging Nettle	*Cnidoscolus stimulosus*
Laurel Oak	*Quercus hemispaerica*		Sweetbay	*Magnolia virginiana*
Lespedeza	*Lespedeza capitata*		Sweet Gum	*Lyiquidambar styriciflua*
Live Oak	*Quercus virginiana*		Titi	*Cyrilla rcemiflora*
Loblolly Pine	*Pinus taeda*		Turkey Oak	Quercus laevis
Longleaf Pine	*Pinus Palustris*		Vanilla Plant	*Carphephorus odoratissimus*
Muscadine	*Vitis rotundifolia*		Virginia Creeper	*Parthenocissis quinquefolia*
Myrtle Oak	*Quercus myrtifolia*		Wax Myrtle	*Myrica cerifera*
Myrtle-leaved Holly	*Ilex myrtifolia*		Winged Sumac	*Rhus copallina*
Orange Grass	*Hypericum gentianoides*		Yaupon Holly	*Ilex vomitoria*
Persimmon	*Diospyros virginiana*		Yellow Wood Sorrel	*Oxalis stricta*

Source: Reetz, Personal Communication, 2013

Table A1-2. Observed Plant Species in the Low Wetlands in Gulf State Park.

COMMON NAME	SCIENTIFIC NAME		COMMON NAME	SCIENTIFIC NAME
Aster	*Aster* sp.		Mistflower	*Conoclinium coelestinum*
Black Titi	*Cliftonia monophylla*		Mock Bishop's Weed	*Ptilimnium capillaceum*
Black Willow	*Salix nigra*		Morning Glory	*Ipomoea sp.*
Blue-eyed grass	*Sisyrinchium albidum*		Muscadine	*Vitis rotundifolia*
Bluet	*Hedyotis caerulea*		Partridge Pea	*Cassia aspera*
Butterfly-pea	*Clitoria mariana*		Persimmon	*Diospyros virginiana*
Buttonbush	*Cephalanthus occidentalis*		Primrose Willow	*Ludwigia peruviana*
Cardinal Flower	*Lobelia cardinalis*		Purple Lobelia	*Lobelia elongata*
Catalpa	*Catalpa bignonioides*		Quaking Grass	*Briza minor*
Chinese Privet	*Ligustrum sinense*		Red Bay	*Persea borbonia*
Cinnamon Fern	*Osmunda cinnamomea*		Red Mulberry	*Morus rubra*
Common Pokeweed	*Phytolacca americana*		Royal Fern	*Osmunda regalis*
Conradina	*Conradina* sp.		Salt Marsh mallow	*Kosteletzkya virginica*
Coral Honeysuckle	*Lonicera sempervirens*		Saw Palmetto	*Serenoa repens*
Earth Smoke	*Fumaria officinalis*		Seymaria	*Seymeria cassioides*
Dodder	*Cuscuta gronovii*		Slash Pine	*Pinus elliotti*
Dog-fennel	*Eupatorium capillifolium*		Sneezeweed	*Helenium autumnale*
Dwarf Huckleberry	*Gaylussacia dumosa*		Southern Magnolia	*Magnolia grandiflora*
Elder-berry	*Sambucus canadensis*		Spanish Bayonet	*Yucca gloriosa*
False Foxglove	*Aureolaria flava*		Spiderwort	*Tradescantia virginiana*
Fetter Bush	*Leucothoe racemosa*		St. Andrew's Cross	*Hypericum hypericoides*
Frog Fruit	*Phyla nodiflora*		St. John's Wort	*Hypericum tetrapetalum*
Gerardia	*Agalinis fasciculata*		Sweet Bay	*Magnolia virginiana*
Giant Foxglove	*Setaria magna*		Sweetgum	*Liquidambar styraciflua*
Goldenrod	*Solidago* sp.		Tickweed	*Coreopsis major*
Groundsel Tree	*Baccharis halimifolia*		Titi	*Cyrilla racemiflora*
Henbit	*Lamium amplexicaule*		Toadflax	*Linaria canadensis*
Lantana	*Lantana camara*		Virginia Creeper	*Parthenocissus quinquefolia*
Lizard's Tail	*Saururus cernuus*		Water Oak	*Quercus nigra*
Loblolly Pine	*Pinus taeda*		Water Tupelo	*Nyssa aquatica*
Marsh Heliotrope	*Heliotropium curassavicum*		Wax Myrtle	*Myrica cerifera*
Marsh Mallow	*Hibiscus grandifolia*		Wild Poinsettia	*Euphorbia heterophylla*
Mexican Clover	*Richardia brasiliensis*		Winged Sumac	*Rhus copallina*
Milk Pea	*Galactia volubilis*			

Source: Reetz, Personal Communication, 2013

Table A1-3. Observed Plant Species in the Dunes in Gulf State Park.

COMMON NAME	SCIENTIFIC NAME		COMMON NAME	SCIENTIFIC NAME
Aster	*Aster* sp.		Rosemary	*Ceratiola ericoides*
Beach Grass	*Panicum amarum*		Sand Pine	*Pinus clausa*
Beach Sunflower	*Helianthus debilis*		Sand Post Oak	*Quercus margaretta*
Common Purslane	*Portulaca oleracea*		Sand Vetch	*Vicia acutifolia*
Croton	*Croton glandulosus*		Sandhill Milkweed	*Asclepias humistrata*
Evening Primrose	*Oenothera* sp.		Sea Oats	*Uniola paniculata*
Gaillardia	*Gaillardia aestivalis*		Sea Rocket	*Cakile edentula*
Morning Glory	*Ipomoea* sp.		Seashore Elder	*Iva imbricata*
Pineland Baptisia	*Baptisia* sp.		Short Leaf Pine	*Pinus echinata*
Prickley Pear	*Opuntia pusilla*		Small Flower Morning Glory	*Jacquemontia tamnifolia*
Railroad Vine	*Ipomoea brasiliensis*		Square Flower	*Paronychia erecta*
Reindeer Moss	*Cladonia subtenuis*		Virginia Pepperweed	*Lepedium virginicum*

Source: Reetz, Personal Communication, 2013

Table A1-4. Observed Plant Species in the Bogs in Gulf State Park.

COMMON NAME	SCIENTIFIC NAME		COMMON NAME	SCIENTIFIC NAME
Aster	*Aster* sp.		Parrot Pitcher Plant	*Sarracenia psittacina*
Bog Buttons	*Lachnocaulon anceps*		Purple Bladderwort	*Utricularia purpurea*
Broom Sedge	*Andropogon virginicus*		Rattlebox	*Crotalaria* sp.
Candyroot	*Polygala lutea*		Redroot	*Lachnanthes caroliniana*
Chapman's Butterwort	*Pinguicula planifolia*		Red Pogonia	*Pogonia ophioglossoides*
Colicroot	*Aletris farinosa*		Seedbox	*Ludwigia alternifolia*
Dew Threads	*Drosera filiformis*		Sundew	*Drosera* sp.
Drum Heads	*Polygala cruciata*		Sweet Pitcher Plant	*Sarracenia rubra*
Goldenrod	*Solidago* sp.		Whitetop Pitcher Plant	*Sarracenia leucophylla*
Grass Pink	*Calopogon pulchellus*		Whitetop Sedge	*Dichromena colorata*
Hairy Wick	*Kalmia hirsuta*		Wire Grass	*Aristida beyrichiana*
Hatpins	*Eriocaulon compressum*		Wiry Bladderwort	*Utricularia subulata*
Meadow Beauty	*Rhexia nashii*		Yellow Butterwort	*Pinguicula lutea*
Morning Glory	*Ipomoea* sp.		Yellow Rhexia	*Rhexia lutea*
Nodding Lady's Tresses	*Spiranthes vernalis*		Yellow-eyed Grass	*Xyris iridifolia*

Source: Reetz, Personal Communication, 2013

Table A1-5. Observed Plant Species in the Marshes in Gulf State Park.

COMMON NAME	SCIENTIFIC NAME		COMMON NAME	SCIENTIFIC NAME
Alligator Weed	*Alternanthera philoxeroides*		Needle Rush	*Juncus roemerianus*
Aster	*Aster* sp.		Pickerel Weed	*Pontederia cordata*
Black Willow	*Salix nigra*		Poor Joe	*Diodia teres*
Cattail	*Typha latifolia*		Prickly Poppy	*Argemone albiflora*
Climbing Hempweed	*Mikania scandens*		Red Sorrel	*Tumex acetosella*
Corkwood	*Stillingia aquatica*		Redroot	*Lachnanthes caroliniana*
Duck Potato	*Sagittaria latifolia*		Roundheaded Rush	*Juncus scirpides*
Duckweed	*Lemna minor*		Saltmarsh Bulrush	*Scirpus robustus*
Golden Canna	*Canna flaccida*		Saw Grass	*Cladium jamaicense*
Goldenrod	*Solidago* sp.		Softstem Bulrush	*Scirpus tabernaemontani*
Jointweed	*Polygonella articulata*		String Lily	*Crinum americanum*
Knotweed	*Polygonum aviculare*		Swamp Loosestrife	*Decodon verticillatus*
Morning Glory	*Ipomoea* sp.		Water Lily	*Nymphaea odorata*

Source: Reetz, Personal Communication, 2013

Table A1-6. Observed Invasive Plant Species in Gulf State Park.

COMMON NAME	SCIENTIFIC NAME		COMMON NAME	SCIENTIFIC NAME
Chinese Tallow Tree	*Sapium sebiferum*		Silk-tree Mimosa	*Albizia julibrissin*
Cogongrass	*Imperata cylindrica*		Spiny Nightshade	*Solanum sisymbriifolium*
Japanese Climbing Fern	*Lygodium japonicum*			

Source: Reetz, Personal Communication, 2013

Table A1-7. Mammals of Gulf State Park.

COMMON NAME	SCIENTIFIC NAME	HABITAT TYPE/POTENTIAL TO OCCUR IN PROPOSED PROJECT AREAS
Armadillo	*Dasypus novemcinctus*	Found in most habitat types in Alabama, but tend to avoid very dry or very wet areas. Yes – possible in proposed trail sites.
Beaver	*Castor canadensis*	Found in aquatic, wet areas with adequate food supplies. Yes – possible in proposed trail sites that cross through aquatic areas.
Big Brown Bat	*Eptesicus fuscus*	Found in nearly all habitat types including forest and open areas. May roost in buildings. Yes – possible in proposed trail sites.
Black Bear	*Ursus americanus*	Found in mixed hardwood/pine forested areas that support dense undergrowth/thickets that provide food and cover. Scattered wetlands, streams, and ponds provide additional sources of food as well as water. Black bears require large tracts of land undisturbed by man. Yes – possible in proposed trail sites.
Bobcat	*Felis rufus*	Found in a variety of habitats such as heavily wooded uplands, bottomland forest, brushy areas, swamps and semi-open farmland but prefer rocky outcrops and canyons.

COMMON NAME	SCIENTIFIC NAME	HABITAT TYPE/POTENTIAL TO OCCUR IN PROPOSED PROJECT AREAS
		Yes – possible transient in proposed trail sites.
Cotton Mouse	*Peromyscus gossypinus*	Found in dense underbrush, bottomland hardwood forests, and a variety of other habitats, including old fields, upland forests, hammocks, and swamps. Yes – possible in proposed trail sites.
Coyote	*Canis latrans*	Common in all habitats. Yes – possible transient through all proposed project sites.
Dolphin	*Tursiops truncatus*	Marine areas – Gulf of Mexico. No – proposed project sites are not within the Gulf of Mexico.
Eastern Cottontail	*Sylvilagus floridanus*	Found in early growth habitats such as fields and fencerows. Yes – possible in proposed trail sites.
Evening Bat	*Nycticeius humeralis*	Typically found in forest habitat but may inhabit urban areas and roost in buildings. Yes – possible in proposed trail sites.
Fox Squirrel	*Sciurus niger*	Found in diverse habitats; in Alabama found in bottomland hardwoods, the shores of bayous, deep cypress swamps, pine / hardwood forests, and upland sandhill habitat dominated by mature pines and numerous scrub oak species. Yes – possible in proposed trail sites.
Gray Fox	*Urocyon cinereoargenteus*	Preferred gray fox habitat includes thick brush, wooded lowlands and swamps. Yes – possible in proposed trail sites.
Gray Squirrel	*Sciurus carolinensis*	Nearly all habitat types. Yes – possible in all project areas, but most likely not within dune restoration or enhancement areas.
Hispid Cotton Rat	*Sigmodon hispidus*	Found statewide, especially in grassy areas of fields and along roadways. Yes – possible in proposed site for re-establishment of the lodge and research and education facility.
Jaguarundi	*F. Herpailurus yagourondi*	Found in lowland brush areas close to a source of running water, and may include any habitat from dry thorn forest to wet grassland. Yes – possible in proposed trail sites.
Little Brown Bat	*Myotis lucifugus*	Colonies may be in tree cavities, underneath rocks, in piles of wood, in crevices, occasionally in caves, and in a variety of human-made structures. Yes – possible in proposed trail sites.
Marsh Rabbit	*Sylvilagus palustris*	Found in brackish marsh habitat.

COMMON NAME	SCIENTIFIC NAME	HABITAT TYPE/POTENTIAL TO OCCUR IN PROPOSED PROJECT AREAS
		Yes – possible in proposed trail sites that cross aquatic areas.
Meadow Vole	*Microtus pennsylvanicus*	Found in grassy fields, woodland, marshes, and along lakes and rivers. Yes – possible in proposed trail sites and proposed site for research and education facility.
Mole	*Scalopus aquaticus*	Eastern moles prefer meadows, pastures, fields, and open woodlands. They prefer to be underground and rarely come to the surface. Yes – possible in proposed trail sites and proposed site for research and education facility.
Norway Rats	*Rattus norvegicus*	Prevalent in nearly all habitats near humans. Requires food, water, and harborage provided by humans. Yes – possible in all proposed project sites, less likely in dunes and on undeveloped areas (where there is less human presence).
Old Field Mouse	*Peromyscus polionotus*	Primarily distributed in sandy-soiled habitats in eastern and southern Alabama, but also occurs in west-central and northwestern parts of state. Occurs in fallow fields with herbaceous vegetation, and along roadsides in agricultural areas. Yes – possible in proposed site for the re-establishment of the lodge on the road side and proposed trail sites.
Raccoon	*Procyon lotor*	Found in bottomland hardwoods, swamps, pine/hardwood forest, farmlands, wooded residential areas in cities and towns, and other areas that have a supply of den trees, food and water. Yes – possible in proposed trail sites.
Red Bat	*Lasiurus borealis*	Red bats are forest-dwelling bats and inhabit deciduous, coniferous, and mixed woodlands. Yes – possible in proposed trail sites.
Red Fox	*Vulpes vulpes*	Found in a variety of habitats but the most preferred habitat contains open and/or cultivated lands interspersed with wooded areas. Yes – possible in all proposed project areas, particularly as a transient.
River Otter	*Lutra Canadensis*	Inhabit unpolluted freshwater waterways such as rivers, streams, lakes, ponds, and swamps or marshes. Yes – possible in proposed trail sites that cross aquatic areas.
Shrews	*Cryptotis parva*	Found in damp areas or areas close to water. Yes – possible in proposed trail sites and proposed site for research and education facility.
Southern Flying	*Glaucomys volans*	Prefer mature hardwood forests but are found in most forested

COMMON NAME	SCIENTIFIC NAME	HABITAT TYPE/POTENTIAL TO OCCUR IN PROPOSED PROJECT AREAS
Squirrel		habitats. Yes – possible in proposed site for new trails.
Virginia Opossum	*Didelphis virginiana*	The opossum lives in a wide-variety of habitats including deciduous forest, open woods and farmland. It tends to prefer wet areas like marshes, swamps and stream and river bottoms. Yes – possible in proposed trail sites.
White-Tailed Deer	*Odocoileus virginianus*	Found in virtually all habitat types. Yes – potential in all proposed project areas.
Wild Hog	*Sus scrofa*	Feral swine are an adaptable species that utilize a variety of habitat types from bottomland hardwoods forests, marshes, and swamps to agricultural lands. Feral swine prefer large forested areas with abundant hard and soft mast crops interspersed with marshes, ponds, drainages, dense cover, and limited human disturbance. Yes – possible in proposed trail sites.

Source: Reetz, Personal Communication, 2013;Alabama Department of Conservation and Natural Resources, 2013.

Table A1-8. Reptiles and Amphibians of Gulf State Park.

COMMON NAME	SCIENTIFIC NAME	HABITAT TYPE/POTENTIAL TO OCCUR IN PROPOSED PROJECT AREAS
Lizards, Geckos, and Skinks		
Broadhead skink	*Eumeces laticeps*	Prefers wooded areas and can often be found in spreading live oak trees in maritime forests. Yes – possible in proposed trail sites.
Brown Anole	*Anolis sagrei*	They are often found at forest edges, disturbed areas, and generally open sites, but are present in many diverse habitats. Yes – possible in all proposed project sites.
Eastern Glass Lizard	*Ophisaurus ventralis*	Typically inhabit wet meadows, grasslands and pine flatwoods. Yes – possible in proposed trail sites.
Fence Lizard	*Sceloporus undulatus hyacinthinus*	Prefers dry, open woodlands and rocky areas. Yes – possible in proposed trail sites.
Five-Lined Lizard	*Eumeces fasciatus*	Prefer moist, partially wooded habitat that provides ample cover or inside walls of buildings as well as sites to bask in the sun. Yes – possible in proposed trail sites.
Green Anole	*Anolis carolinensis*	Inhabits a variety of vegetated habitats, including residential areas. Yes – possible in all proposed project sites.
Ground Skink	*Scincella lateralis*	Inhabits most terrestrial forested habitats.

COMMON NAME	SCIENTIFIC NAME	HABITAT TYPE/POTENTIAL TO OCCUR IN PROPOSED PROJECT AREAS
		Yes – possible in proposed trail sites.
Mediterranean Gecko	*Hemidactylus turcicus*	Found locally in and near buildings of urban areas. In nature it would be found under palm leaves and in the crevices of tree bark and rocky outcroppings. Not likely – there are no structures within the proposed project sites.
Six-lined Racerunner	*Cnemidophorus sexlineatus sexlineatus*	Inhabit well-drained upland sites, preferring loose soil or sand. They like open fields, natural openings, or disturbed areas that allow for sun-bathing and foraging for insects. Yes – possible in all proposed project sites.
Southeastern Five-Lined Skink	*Eumeces inexpectatus*	Frequently encountered, often in, or near, rotting logs and stumps, rocks, and trash piles. Yes – possible in proposed trail sites.
Turtles		
Common Musk Turtle (Stinkpot)	Sternotherus odoratus	Found in a variety of sluggish water environments. Yes – possible in proposed trail sites that cross aquatic areas.
Cooter	Pseudemys ssp.	Found in rivers, lakes, and common streams. Not likely – proposed project sites do not include this type of habitat.
Diamondback Terrapin	*Malaclemys terrapin macrospilota*	Found in brackish swamps. Yes – possible in proposed trail sites that cross aquatic areas.
Eastern Box Turtle	*Terrapene carolina carolina*	Frequently encountered in or near forested areas, or alongside roadways. Yes – possible in proposed trail sites.
Eastern Mud Turtle	*Kinosternon subrubrum subrubrum*	Common statewide in virtually all aquatic habitats except free-flowing creeks and rivers. Often wanders on land and is frequently seen crossing roads. Yes – possible in proposed trail sites.
Florida Softshell	*Apalone ferox*	Inhabits sluggish streams, lakes, and ponds. Not likely – proposed project sites do not include this type of habitat.
Gulf Coast Box Turtle	*Terrapene carolina major*	Frequently encountered in or near forested areas, or alongside roadways. Yes – possible in proposed trail sites.
Loggerhead Musk Turtle	*Sternotherus minor minor*	Bottom-dwelling species, found in creeks and rivers. Yes – possible in proposed trail sites that cross aquatic

COMMON NAME	SCIENTIFIC NAME	HABITAT TYPE/POTENTIAL TO OCCUR IN PROPOSED PROJECT AREAS
		areas.
Red-Eared Slider	*Trachemys scripta elegans*	Prefer ponds, swamps, or slow-flowing portions of rivers and estuaries. Yes – possible in proposed trail sites that cross aquatic areas.
Snapping Turtle	*Chelydra serpentina*	Found in a wide variety of permanently aquatic habitat. Yes – possible in proposed trail sites that cross aquatic areas.
Spiny Softshell	*Apalone spinifera spp.*	Inhabits streams and lakes. Not likely – proposed project sites do not include this type of habitat.
Yellowbelly Slider	*Trachemys scripta scripta*	Habitat generalist, being found in slow-moving rivers, floodplain swamps, marshes, and permanent ponds. Yes – possible in proposed trail sites that cross aquatic areas.
Snakes		
Banded Water Snake	*Nerodia fasciata fasciata*	Found in nearly all freshwater habitats, including ponds, lakes, streams, rivers, and marshes. Yes – possible in proposed trail sites that cross aquatic areas.
Black Racer	*Coluber constrictor constrictor*	Abundant in edge type habitats where two or more habitats meet such as the borders of swamps, old fields, and agricultural lands. Yes – possible in proposed trail sites.
Brown Water Snake	*Nerodia taxispilota*	Found in cypress swamps and even occasionally in brackish waters, particularly where there is a lot of overhanging vegetation. They often bask on logs, branches, or bushes above the water. Yes – possible in proposed trail sites that cross aquatic areas.
Corn Snake	*Elaphe guttata*	Corn snakes nest in loose soil or organic debris, are mainly nocturnal, and are found in a variety of terrestrial habitats that support sizeable small rodent populations. Yes – possible in all proposed project sites, possibly less likely in dune restoration and enhancement areas.
Dusky Pigmy Rattlesnake	*Sistrurus miliarius barbouri*	Found in a variety of habitats including everglades prairies, palmetto-pine flatwoods, sandhills, mixed pine-hardwood forests, borders of cypress ponds, and in the vicinity of lakes and marshes. One note is that they are seldom found in extremely dry habitats. Yes – possible in proposed sites for trails, and proposed

COMMON NAME	SCIENTIFIC NAME	HABITAT TYPE/POTENTIAL TO OCCUR IN PROPOSED PROJECT AREAS
		site for research and education facility.
Eastern Coachwhip	*Masticophis flagellum flagellum*	Found in sparse grassy woods and fields, some scrubby areas. Yes – possible in proposed sites for trails, possibly dune restoration enhancement areas with scrub vegetation.
Eastern Coral Snake	*Micrurus fulvius fulvius*	Prefers dry, open, or brushy areas ranging from hardwood forests to pine flatwoods. Seems to require friable, loose soil. Yes – possible in all proposed project sites, possibly less likely in dune restoration and enhancement areas.
Eastern Diamondback Rattlesnake	*Crotalus adamanteus*	Found in dry pine flatwoods and longleaf pine-turkey oak hills. It is able to survive in altered habitats such as overgrown fields and abandoned farms. Although the eastern diamondback rattlesnake is usually associated with sandhill communities, it will venture into swampy and marshy habitats. Yes – possible in proposed sites for trails.
Eastern Kingsnake	*Lampropeltis getula getula*	Ground-dwelling; found in diverse terrestrial habitats. Yes – possible in all proposed project sites, possibly less likely in dune restoration and enhancement areas.
Florida Cottonmouth	*Agkistrodon piscivorus conanti*	Any wetlands or waterways within their range. They inhabit brackish waters and are commonly found in swamps, streams, springs, ponds, sloughs, reservoirs, marshes, and road side drainage ditches. The cottonmouth commonly suns itself on branches, logs, or stones at the water's edge. It will sometime wander away from its normal habitat in search of food. Yes – possible in proposed sites for trails.
Florida Green Water Snake	*Nerodia floridana*	Found in highly aquatic areas and prefer still wetlands with a high density of aquatic vegetation. Yes – possible in proposed sites for trails that cross aquatic areas.
Gray Rat Snake	*Elaphe obsoleta spiloides*	Occurs in most kinds of terrestrial habitats but attains greatest densities in areas where forests and farmland are generally intermixed and small rodents are relatively abundant. Yes – possible in all proposed project areas.
Gulf Salt Marsh Snake	*Nerodia clarkii clarkii*	Coastal salt marshes and brackish estuaries. They usually are not found in freshwater environments. Yes – possible in proposed sites for trails that cross aquatic areas.
Mississippi Green Water Snake	*Nerodia cyclopion*	Found in calm waters such as lakes, ponds, swamps, marshes, or bayous. They sometimes are found in

COMMON NAME	SCIENTIFIC NAME	HABITAT TYPE/POTENTIAL TO OCCUR IN PROPOSED PROJECT AREAS
		brackish waters. Yes – possible in proposed sites for trails that cross aquatic areas.
Mud Snake	*Farancia abacura*	Found in beaver swamps, ponds, floodplains, and sluggish streams. Yes – possible in proposed sites for trails that cross aquatic areas.
Peninsula Ribbon Snake	*Thamnophis sauritus sackenii*	Prefer moist environments such as wetlands, ponds, stream edges, rivers, and other sources of flowing and standing water. They primarily look for areas that are well vegetated with cattails, grasses, shrubs, and other plant life. Yes – possible in proposed sites for trails that cross aquatic areas.
Pine Woods Snake	*Rhadinaea flavilata*	Found in damp pine flatwoods; occasionally appears in residential areas. Yes – possible in proposed sites for trails.
Rainbow Snake	*Farancia erytrogramma*	A semi-aquatic burrowing snake of rivers, large creeks, and occasionally ponds. Not likely – this type of habitat is not present in the proposed project sites.
Ringneck Snake	*Diadophis ssp.*	Found in woodland areas. Yes – possible in proposed sites for trails.
Rough Green Snake	*Opheodrys aestivus*	Heavily vegetated terrestrial habitats, including overhanging branches around lakes and streams. Yes – possible in proposed sites for trails.
Scarlet Kingsnake	*Lampropeltis triangulum elapsoides*	Found in pinelands and hardwood hammocks. It is a terrestrial burrower but can climb very well. It is often found under rocks and bark of dead trees, and in rotting logs. It has also been found in suburban areas that have encroached on their former habitat. Yes – possible in proposed sites for trails.
Scarlet Snake	*Cemophora coccinea*	Found in forested habitats having dry sandy soils. They are terrestrial burrowers, typically found under rocks, rotten logs, leaf litter, or debris such as roofing tin, boards, or trash. They often are found in suburban areas located with areas of suitable habitat. Yes – possible in proposed sites for trails.
Southeastern Crowned Snake	*Tantilla coronata*	Dry woodland ridges and hillsides. Often found under rocks, logs, and in rotting stumps. Yes – possible in proposed sites for trails.

COMMON NAME	SCIENTIFIC NAME	HABITAT TYPE/POTENTIAL TO OCCUR IN PROPOSED PROJECT AREAS
Speckled Kingsnake	*Lampropeltis getula holbrooki*	Ground-dwelling; found in diverse terrestrial habitats. Yes – possible in all proposed project sites, possibly less likely in dune restoration and enhancement areas.
Yellowbelly Water Snake	*Nerodia erythrogaster flavigaster*	Found near the larger and more permanent bodies of water, such as marshes, swamps, river bottoms, and along the edges of lakes and ponds. Yes – possible in proposed sites for trails that cross aquatic areas.
Salamanders		
Amphiuma	*Amphiuma*	Deep, liquid, organic muck in alluvial swamps of larger streams, or, less commonly, in mucky habitats associated with small headwater brooks and seepages. Yes – possible in proposed sites for trails that cross aquatic areas.
Toads		
American Toad	*Bufo americanus*	Found in temporary woodland pools for breeding; near deciduous forest otherwise. Yes – possible near proposed trail sites that cross aquatic areas.
Eastern Narrowmouth Toad	*Gastrophryne carolinensis*	A secretive burrowing frog that breeds April to September in vegetated margins of lakes, ponds, and ditches. Yes – possible near proposed trail sites that cross aquatic areas and proposed site for research and education facility.
Eastern Spadefoot	*Scaphius holbrookii holbrookii*	Found in wetlands and pools. Yes – possible near proposed trail sites that cross aquatic areas.
Gulf Coast Toad	*Bufo valliceps*	Found in a wide range of habitats, including open grassland, semi-arid regions, light forest, and even suburban backyards. They are typically found not far from a permanent water source. Yes – possible near proposed trail sites and proposed site for research and education facility.
Oak Toads	*Bufo quercicus*	Inhabits areas of sandy soils, especially fire-maintained pine flatwoods. Breeds in temporary pools. Yes – possible near proposed trail sites that cross aquatic areas.
Southern Toad	*Bufo terrestris*	Inhabits sandy soil environments. However, these toads have been observed inhabiting marshes, mixed hardwood swamps, agricultural fields, and pine woodlands.

COMMON NAME	SCIENTIFIC NAME	HABITAT TYPE/POTENTIAL TO OCCUR IN PROPOSED PROJECT AREAS
		Yes – possible near proposed trail sites that cross aquatic areas.
Chorus Frogs		
Northern spring peepers	*Pseudacris crucifer*	During the breeding season, found around permanent or temporary ponds particularly in or near wooded areas. Difficult to find outside of the breeding season, as they retreat to damp, wooded areas. Yes – possible near proposed trail sites that cross aquatic areas.
Southern Cricket Frog	*Acris gryllus gryllus gryllus*	Found in many different permanent aquatic habitats such as bogs, marshes, swamps, ponds and ditches. They will utilize temporary collections of water and prefers densely vegetated areas. Yes – possible near proposed trail sites that cross aquatic areas.
Treefrogs		
Bird-Voiced Treefrog	*Hyla avivoca*	Forested swamps, beaver ponds, and floodplains. Yes – possible in proposed trail sites that cross aquatic areas.
Gray Treefrog	*Hyla versicolor*	Prefer swamps or wooded ponds and streams where they can find a relatively high perch on a tree or shrub to call from. At night they may leave the trees and move to the ground to feed. Yes – possible in proposed trail sites.
Green Treefrog	*Hyla cinerea*	Found in permanent aquatic habitats with emergent vegetation. Yes – possible in proposed trail sites that cross aquatic areas.
Squirrel Treefrog	*Hyla squirella*	Temporary pools and ponds, exploits a variety of habitats, and often encountered around buildings. Yes – possible in proposed trail sites and proposed location for research and education facility.
True Frogs		
Bronze Frog	*Rana clamitans clamitans*	Prefers swamps, small streams, and other aquatic habitats. Yes – possible in proposed trail sites that cross aquatic areas.
Green Frog	*Rana clamitans melanota*	Prefers swamps, small streams, and other aquatic habitats. Yes – possible in proposed trail sites that cross aquatic areas.
Pig Frog	*Rana grylio*	A highly aquatic frog of permanent, open water bodies with emergent vegetation.

COMMON NAME	SCIENTIFIC NAME	HABITAT TYPE/POTENTIAL TO OCCUR IN PROPOSED PROJECT AREAS
		Yes – possible in proposed trail sites that cross aquatic areas.
Southern Leopard Frog	*Rana utricularia*	Fairly aquatic but ranges away from water when foraging. Often seen on roads. Yes – possible in proposed trail sites that cross aquatic areas; possible in proposed sites for the re-establishment of the lodge and interpretive center, as these sites are near roadways.

Source: Reetz, Personal Communication, 2013;Alabama Department of Conservation and Natural Resources, 2013.

Table A1-9. Birds of Gulf State Park that May be Present in the Vicinity of Proposed Project Sites.

COMMON NAME	SCIENTIFIC NAME	HABITAT
Vermilion Flycatcher	*Pyrocephalus rubinus*	Riparian areas and scrub.
Ash-throated Flycatcher	*Myiarchus cinerascens*	Open woodlands.
Great Crested Flycatcher	*Myiarchus crinitus*	Found in woodlands, open country with scattered trees, and parks.
Western Kingbird	*Tyrannus verticalis*	Open country with scattered trees, especially agricultural lands.
Eastern Kingbird	*Tyrannus tyrannus*	Open rural areas with scattered trees and shrubs, along woodland edges, and in agricultural fields with hedgerows, especially near ponds or rivers.
Gray Kingbird	*Tyrannus dominicensis*	Open habitats and on beaches and sand dunes with scattered trees and scrub vegetation.
Scissor-tailed Flycatcher	*Tyrannus forficatus*	Open country, dry grasslands, and agricultural lands.
Purple Martin	*Progne subis*	Open areas, often near water.
Tree Swallow	*Tachycineta bicolor*	Open areas near woods and water.
Northern Rough-winged Swallow	*Stelgidopteryx serripennis*	Open areas, especially near water and cutaway banks.
Bank Swallow	*Riparia riparia*	Open areas near water with cutaway banks.
Cliff Swallow	*Petrochelidon pyrrhonota*	Open areas near cliffs, bridges, and outbuildings.
Barn Swallow	*Hirundo rustica*	Open country near barns or open outbuildings, bridges, or culverts.
Blue Jay	*Cyanocitta cristata*	Woods and suburbs.
American Crow	*Corvus brachyrhynchos*	Varied habitats.
Fish Crow	*Corvus ossifragus*	Coastal habitats or inland along rivers.
Carolina Chickadee	*Poecile carolinensis*	Woods, farmland, suburbs.
Tufted Titmouse	*Baeolophus bicolor*	Woods and suburbs.
Red-breasted Nuthatch	*Sitta Canadensis*	Coniferous forests.
White-breasted Nuthatch	*Sitta carolinensis*	Deciduous and mixed forests.
Brown-headed Nuthatch	*Sitta pusilla*	Pine forests.
Brown Creeper	*Certhia Americana*	Woods.
Carolina Wren	*Thryothorus ludovicianus*	Forest understory, vines, and woodlands in rural or suburban areas.
Bewick's Wren	*Thryomanes bewickii*	Thickets, brush, and open woodlands in rural or suburban areas.
House Wren	*Troglodytes aedon*	Edges of woods in rural or suburban areas.
Winter Wren	*Troglodytes hiemalis*	Summers along rocky woodland streams, especially in coniferous forests; winters in woods, wood piles, and tangles.
Marsh Wren	*Cistothorus palustris*	Marshy areas, especially with tall cattails and rushes.
Golden-crowned Kinglet	*Regulus satrapa*	Summers in coniferous woods; winters also in mixed and deciduous forests.
Ruby-crowned Kinglet	*Regulus calendula*	Summers in coniferous woods; winters in woods and brushy edges.
Blue-gray Gnatcatcher	*Polioptila caerulea*	Woods, swamps, and brushy areas.
Eastern Bluebird	*Sialia sialis*	Farmland and rural yards; open woodlands.

COMMON NAME	SCIENTIFIC NAME	HABITAT
Veery	*Catharus fuscescens*	Moist deciduous woods, especially along streams.
Gray-cheeked Thrush	*Catharus minimus*	Coniferous woods at tree line, tall shrubby areas.
Swainson's Thrush	*Catharus ustulatus*	Coniferous and mixed woods, shrub thickets along streams.
Hermit Thrush	*Catharus guttatus*	Coniferous and mixed woods, shrub thickets.
Wood Thrush	*Hylocichla mustelina*	Deciduous woods in rural to urban areas.
American Robin	*Turdus migratorius*	Various habitats, from woods to open lawns and plains to timberline.
Gray Catbird	*Dumetella carolinensis*	Shrubs, thickets, woods edges; rural to suburban.
Northern Mockingbird	*Mimus polyglottos*	Open areas with shrubs, gardens, parks.
Brown Thrasher	*Toxostoma rufum*	Thickets and shrubs in open areas or at woods edges.
Water Pipit	*Anthus spinoletta*	Fields.
Cedar Waxwing	*Bombycilla cedrorum*	Open rural or suburban areas.
Loggerhead Shrike	*Lanius ludovicianus*	Open country with some shrubs and trees.
European Starling	*Sturnus vulgaris*	Urban and suburban areas.
White-eyed Vireo	*Vireo griseus*	Found in undergrowth, early successional fields, streamside thickets, and along woodland edges
Solitary Vireo	*Vireo solitaries*	Mixed coniferous and deciduous woods.
Yellow-throated Vireo	*Vireo flavifrons*	Found in tall, open woodlands, especially near water
Warbling Vireo	*Vireo gilvus*	Found in open, park-like woodlands, with tall trees, especially near water
Philadelphia Vireo	*Vireo philadelphicus*	Found in woodlands.
Red-eyed Vireo	*Vireo olivaceus*	Found in deciduous woods, mixed forests, shade trees, and woodlots.
Black-whiskered Vireo	*Vireo altiloquus*	Coastal mangroves.
Blue-winged Warbler	*Vermivora cyanoptera*	Second growth forests, brushy fields.
Golden-winged Warbler	*Vermivora chrysoptera*	Forest openings or edges, overgrown fields.
Tennessee Warbler	*Oreothlypis peregrine*	Deciduous, mixed, or coniferous woods, forest clearings.
Orange-crowned Warbler	*Oreothlypis celata*	Dense thickets, forest edges, brushy fields.
Nashville Warbler	*Oreothlypis ruficapilla*	Open, second growth woods, thickets, woodland edges.
Northern Parula	*Setophaga Americana*	Deciduous and coniferous forests, usually near wetlands.
Yellow Warbler	*Setophaga petechial*	Shrubby areas, especially near water with willows and alder, yards, gardens.
Chestnut-sided Warbler	*Setophaga pensylvanica*	Undergrowth in cutover woods, shrubby regrowth, roadside thickets.
Magnolia Warbler	*Setophaga magnolia*	Woodlands and coniferous forests, especially thickets of spruce, hemlock, balsam fir. Most abundant in earlier growth habitats.
Cape May Warbler	*Setophaga tigrina*	Spruce forests; in migration, woodlands.
Black-throated Blue Warbler	*Setophaga caerulescens*	Mature mixed woodlands with well-developed understory, cutover areas.
Yellow-rumped Warbler	*Setophaga coronate*	Coniferous or mixed forests. In winter, brushy thickets of bayberry and wax myrtle.
Black-throated Green Warbler	*Setophaga virens*	Open coniferous and mixed deciduous forests, second growth.
Blackburnian Warbler	*Setophaga fusca*	Mature coniferous woods, especially with hemlocks; also deciduous woods.

COMMON NAME	SCIENTIFIC NAME	HABITAT
Yellow-throated Warbler	*Setophaga dominica*	Live oak woodland, pine forest, sycamore-cypress swamps, floodplain forest.
Pine Warbler	*Setophaga pinus*	Pine or mixed woodlands.
Prairie Warbler	*Setophaga discolor*	Dry brushy areas, old fields, young pine plantations, mangrove swamps.
Palm Warbler	*Setophaga palmarum*	On migration and in winter, grassy fields, brushy areas, beaches, lawns.
Bay-breasted Warbler	*Setophaga castanea*	Coniferous forests.
Blackpoll Warbler	*Setophaga striata*	Spruce-fir forests. In migration, other woodlands.
Cerulean Warbler	*Setophaga cerulean*	Mature deciduous trees, especially near swampy areas and streams.
Black-and-White Warbler	*Mniotilta varia*	Deciduous and mixed woodlands, especially damp woods.
American Redstart	*Setophaga ruticilla*	Deciduous and mixed woodlands, thickets.
Prothonotary Warbler	*Protonotaria citrea*	Wooded swamps, floodplain forests.
Worm-eating Warbler	*Helmitheros vermivorum*	Wooded hillsides and ravines.
Swainson's Warbler	*Limnothlypis swainsonii*	Swamps, canebrakes.
Ovenbird	*Seiurus aurocapilla*	Mature deciduous or mixed forests.
Northern Waterthrush	*Parkesia noveboracensis*	Wooded ponds, swamps, willow thickets, lake shores, beside still water or slow-moving rivers.
Louisiana Waterthrush	*Parkesia motacilla*	Forested streams.
Kentucky Warbler	*Geothlypis Formosa*	Ravines and bottomlands of moist deciduous or mixed woodlands.
Common Yellowthroat	*Geothlypis trichas*	Dense brushy habitats near wet areas, drier habitats with dense understory.
Hooded Warbler	*Setophaga citrine*	Dense shrubbery in mature deciduous woodlands, especially near streams.
Wilson's Warbler	*Cardellina pusilla*	Willow and alder thickets near water, moist woodlands.
Canada Warbler	*Cardellina Canadensis*	Dense understory of mature deciduous or mixed woodlands, shrubby areas near streams and swamps.
Yellow-breasted Chat	*Icteria virens*	Dense thickets and brushy edges in dry or moist areas.
Summer Tanager	*Piranga rubra*	Pine oak woods, willows and cottonwoods along streams.
Scarlet Tanager	*Piranga olivacea*	Mature deciduous forests.
Rose-breasted Grosbeak	*Pheucticus ludovicianus*	Deciduous woods, mixed shrubs and trees.
Blue Grosbeak	*Passerina caerulea*	Open areas with some shrubbery, such as roadsides, hedgerows, farmlands, and prairies.
Indigo Bunting	*Passerina cyanea*	Brush and low trees near open areas like overgrown fields.
Painted Bunting	*Passerina ciris*	Brush, clearcuts, mesquite, rangeland, thickets.
Dickcissel	*Spiza Americana*	Prairies, weedy fields, grain fields.
Rufous-sided Towhee	*Pipilo erythrophthalmus*	Shrubby edges or open woods with shrub understory.
Bachman's Sparrow	*Peucaea aestivalis*	Open pine or oak woods, brushy fields.
Chipping Sparrow	*Spizella passerine*	Grassy areas, open woods, lawns, and parks.
Clay-colored Sparrow	*Spizella pallida*	Summers in open brushy areas, often near water. In winter, also in weedy fields.
Field Sparrow	*Spizella pusilla*	Open areas with scattered shrubs and small trees.

COMMON NAME	SCIENTIFIC NAME	HABITAT
Vesper Sparrow	*Pooecetes gramineus*	Dry fields with sparse vegetation, occasionally beach grass, sagebrush, forest clearings, or agricultural fields.
Savannah Sparrow	*Passerculus sandwichensis*	A variety of moist tallgrass areas.
Grasshopper Sparrow	*Ammodramus savannarum*	Prairie, dry weedy fields, old pastures, hayfields.
Henslow's Sparrow	*Ammodramus henslowii*	Damp fields and meadows with some shrubs.
Le Conte's Sparrow	*Ammodramus leconteii*	Marshes, wet meadows, weedy fields.
Sharp-tailed Sparrow	*Ammodramus nelson*	Salt and fresh-water marshes, wet meadows, lakeshores.
Seaside Sparrow	*Ammodramus maritimus*	Coastal marshes.
Fox Sparrow	*Passerella iliaca*	Deciduous or coniferous woods, brushy areas, woods edges.
Song Sparrow	*Melospiza melodia*	Dense shrubs at the edge of open areas such as fields, lawns or streams.
Swamp Sparrow	*Melospiza Georgiana*	Summers in freshwater marshes, swamps, bogs; winters also in damp fields with tall grass.
White-throated Sparrow	*Zonotrichia albicollis*	Coniferous and mixed woods, brushy areas.
White-crowned Sparrow	*Zonotrichia leucophrys*	Varied; includes wet meadows, shrubby borders, woods, gardens, parks.
Dark-eyed Junco	*Junco hyemalis*	Summers in woods, woods edges, bogs, winters in woods edges, brush.
Lapland Longspur	*Calcarius lapponicus*	Summers in wet grassy areas of tundras, winters in open grassy areas, plowed agricultural fields, airports, occasionally beaches.
Bobolink	*Dolichonyx oryzivorus*	Hayfields and grasslands.
Red-winged Blackbird	*Agelaius phoeniceus*	Meadows and marshes.
Eastern Meadowlark	*Sturnella magna*	Meadows and grasslands.
Western Meadowlark	*Sturnella neglecta*	Meadows and grasslands.
Yellow-headed Blackbird	*Xanthocephalus xanthocephalus*	Summers in marshes; winters in grain fields.
Rusty Blackbird	*Euphagus carolinus*	Summers in spruce bogs, wet woods; winters in woods and fields near water.
Brewer's Blackbird	*Euphagus cyanocephalus*	Wet meadows, rivers, stream margins bordered by dense shrubs, cultivated areas, parks, desert oases, urban areas, roadsides.
Boat-tailed Grackle	*Quiscalus major*	Salt marshes, parks, lakes.
Common Grackle	*Quiscalus quiscula*	Open areas with some trees, city parks, urban yards, farmland.
Brown-headed Cowbird	*Molothrus ater*	Pastures, woods edges, urban lawns, forest clearings.
Orchard Oriole	*Icterus spurius*	Orchards, open woods, shade trees in towns, wetlands, parks, streamside groves.
Northern Oriole	*Icterus galbula*	Deciduous trees near openings, such as parks, gardens, roads.
Purple Finch	*Haemorhous purpureus*	Mixed woods, coniferous forests, lower mountain slopes, suburban yards.
Pine Siskin	*Spinus pinus*	Coniferous or mixed woods, shrub thickets, suburban yards.
American Goldfinch	*Spinus tristis*	Open areas with some shrubs and trees, farms, suburban yards, gardens.
House Sparrow	*Passer domesticus*	Urban areas, parks, open farmland.
Red-throated Loon	*Gavia stellate*	Summers on lakes; winters mostly along coast.

COMMON NAME	SCIENTIFIC NAME	HABITAT
Common Loon	*Gavia immer*	Summers on lakes; winters mostly along coast.
Pied-billed Grebe	*Podilymbus podiceps*	Summers on lakes and ponds; winters also in sheltered saltwater bays.
Horned Grebe	*Podiceps auritus*	Summers on marshy ponds and lakes; winters mostly along the coast and on some inland lakes.
Eared Grebe	*Podiceps nigricollis*	Summers on lakes and marshes; winters along the coast and on some inland lakes.
Greater Shearwater	*Puffinus gravis*	Open sea.
Masked Booby	*Sula dactylatra*	Open at sea.
Brown Booby	*Sula leucogaster*	Open at sea.
Northern Gannet	*Morus bassanus*	Summers on coastal cliffs and islands, winters at sea.
White Pelican	*Pelecanus erythrorhynchos*	Summers on large inland lakes; winters on the coast.
Brown Pelican	*Pelecanus occidentalis*	Coastal.
Great Cormorant	*Phalacrocorax carbo*	Coastal.
Anhinga	*Anhinga anhinga*	Freshwater swamps, marshes, lakes, and rivers.
Magnificent Frigatebird	*Fregata magnificens*	Ocean, coasts.
American Bittern	*Botaurus lentiginosus*	Freshwater or brackish marshes with tall vegetation.
Least Bittern	*Ixobrychus exillis*	Marshes that include dense vegetation, like sedges and cattails, salt marshes.
Great Blue Heron	*Ardea Herodias*	Marshes, swamps, rivers and lake edges, tidal flats, mangroves, other water areas.
Great Egret	*Ardea albus*	Marshes, swamps, seashores, lake margins.
Snowy Egret	*Egretta thula*	Coastal areas, marshes, river valleys, lake edges.
Little Blue Heron	*Egretta caerulea*	Swamps, inland marshes, and coastal areas.
Tricolored Heron	*Egretta tricolor*	Marshes, shores, mudflats, tidal creeks.
Reddish Egret	*Egretta rufescens*	Shorelines, tidal flats, shallow pools.
Cattle Egret	*Bubulcus ibis*	Open dry areas, lawns, fields, pastures with livestock.
Green-backed Heron	*Butorides striata*	Shores, water edges with dense vegetation.
Black-crowned Night-Heron	*Nycticorax nycticorax*	Diverse – freshwater streams, lakes, rice fields, dry grasslands, salt marshes.
Yellow-crowned Night-Heron	*Nyctanassa violacea*	Coastal as well as ponds, swamps, rivers, park land.
White Ibis	*Eudocimus albus*	Salt and freshwater lakes, marshes, swamps, tidal mudflats, shores.
Glossy Ibis	*Plegadis falcinellus*	Edges of brackish, fresh, and salt waters.
White-faced Ibis	*Plegadis chihi*	Freshwater and brackish marshes.
Snow Goose	*Chen caerulescens*	Summers on tundra; winters on agricultural fields and wetlands.
Canada Goose	*Branta Canadensis*	Summers on lakes, marshes, winters on lakes, bays, fields, parks.
Wood Duck	*Aix sponsa*	Wooded swamps, rivers.
Green-winged Teal	*Anas crecca*	Summer on freshwater ponds and lakes; winters on rivers and sheltered coastal marshes.
Black Duck	*Anas rubripes*	Summers on fresh and saltwater marshes; winters along coast.
Mottled Duck	*Anas fulvigula*	Freshwater or saltwater marshes, mostly coastal.

COMMON NAME	SCIENTIFIC NAME	HABITAT
Mallard	*Anas platyrhynchos*	Lakes, parks, rivers, bays.
Northern Pintail	*Anas acuta*	Summers on open marshes and ponds; winters on coastal bays, lakes and agricultural fields.
Blue-winged Teal	*Anas discors*	Summers on small lakes in open grasslands; winters on marshes and protected coastal areas.
Northern Shoveler	*Anas clypeata*	Summers on open shallow lakes and marshes; winters also on protected coastal areas.
Gadwall	*Anas strepera*	Open lakes and marshes.
American Wigeon	*Anas Americana*	Summers on lakes and marshes; winters on wet meadows, lakes, protected coastal waters.
Redhead	*Aythya Americana*	Ponds, lakes and bays.
Ring-necked Duck	*Aythya collaris*	Summers on open lakes, marshes; winters on large lakes and coastal areas.
Greater Scaup	*Aythya marila*	Summers on tundra lakes; winters on salt water and coastal ponds.
Lesser Scaup	*Aythya affinis*	Summers on prairie lakes and marshes; winters on lakes, sheltered coastal areas, freshwater ponds,
Oldsquaw	*Clangula hyemalis*	Summers on tundra lakes, coastal inlets, winters along the coast.
Black Scoter	*Melanitta Americana*	Summers on tundra lakes; winters along the coast.
Surf Scoter	*Melanitta perspicillata*	Summers on semiwooded arctic lakes and rivers; winters along the coast.
White-winged Scoter	*Melanitta fusca*	Summers on lakes and ponds; winters along the coast.
Common Goldeneye	*Bucephala clangula*	Summers on lakes and marshes; winters on interior and coastal waters.
Bufflehead	*Bucephala albeola*	Summers on wooded lakes and rivers; winters on lakes and coastal waters.
Hooded Merganser	*Lophodytes cucullatus*	Summers on wooded lakes and rivers; winters in similar locations.
Common Merganser	*Mergus merganser*	Summers on wooded lakes and along rivers; winters on large lakes and estuaries, usually on fresh water.
Ruddy Duck	*Oxyura jamaicensis*	Summers on open lakes, winters also along the coast.
Black Vulture	*Coragyps atratus*	Open country, dumps, urban areas.
Turkey Vulture	*Cathartes aura*	Open country and dumps, occasionally roosts in urban areas.
Osprey	*Pandion haliaetus*	Large lakes, rivers, coast.
Swallow-tailed Kite	*Elanoides forficatus*	Woodlands near marshes or swamps.
Mississippi Kite	*Ictinia mississippiensis*	Open woodlands, wooded streams, swamps.
Bald Eagle	*Haliaeetus leucocephalus*	Along coasts, lakes, and large rivers.
Northern harrier	*Circus cyaneus*	Open fields, grasslands, prairies, marshlands.
Sharp-shinned Hawk	*Accipiter striatus*	Summers in mixed deciduous and coniferous woods; winters in woods and near bird feeders.
Cooper's Hawk	*Accipiter cooperii*	Mixed forests and open woodlands.
Red-shouldered Hawk	*Buteo lineatus*	Woodlands and swamps.
Broad-winged Hawk	*Buteo platypterus*	Dry woodlands.

COMMON NAME	SCIENTIFIC NAME	HABITAT
Red-tailed Hawk	*Buteo jamaicensis*	Swamps or woodlands bordering open areas of grasses or water.
Rough-legged Hawk	*Buteo lagopus*	Summers at the arctic tree line; winters in open country.
American Kestrel	*Falco sparverius*	Variety of habitats, including urban areas.
Merlin	*Falco columbarius*	Summers in a variety of habitats; winters in coastal lowlands, prairies, marshes.
Peregrine Falcon	*Falco peregrinus*	Open country near cliffs, urban areas, coast.
Wild Turkey	*Meleagris gallopavo*	Open forests, forest edges, wooded swamps.
Northern Bobwhite	*Colinus virginianus*	Farmland, brushy fields, open woodland.
Yellow Rail	*Coturnicops noveboracensis*	Summers on wet meadows, marshes; winters on grasslands, fields, coastal marshes.
Black Rail	*Laterallus jamaicensis*	Salt and freshwater marshes, wet meadows.
Clapper Rail	*Rallus longirostris*	Salt marshes.
King Rail	*Rallus elegans*	Fresh and brackish marshes.
Virginia Rail	*Rallus limicola*	Summers on freshwater and brackish marshes; winters on salt marsh.
Sora	*Porzana Carolina*	Salt and freshwater marshes, wet meadows.
Purple Gallinule	*Porphyrio martinicus*	Freshwater marshes.
Common Moorhen	*Gallinula chloropus*	Freshwater marshes, ponds, lakes.
American Coot	*Fulica Americana*	Summers on marshy lakes; winters along the coast.
Sandhill Crane	*Grus Canadensis*	Summers on prairies and tundra; during winter roosts on shallow water and feeds in agricultural fields.
Black-bellied Plover	*Pluvialis squatarola*	Summers on arctic tundra; winters on sandy beaches, mudflats, and plowed fields near coast.
Lesser Golder-Plover	*Pluvialis dominica*	Summers on arctic tundra; winters on plowed fields, short-grass fields, mudflats.
Snowy Plover	*Charadrius nivosus*	Sandy beaches.
Wilson's Plover	*Charadrius wilsonia*	Coastal dunes and flats.
Semipalmated Plover	*Charadrius semipalmatus*	Summers on tundra; winters on muddy shores, tidal flats, sandy beaches.
Piping Plover	*Charadrius melodus*	Sandy beaches, lakeshores.
Killdeer	*Charadrius vociferous*	Open ground with gravel or short grass, suburban or rural.
Black-necked Stilt	*Himantopus mexicanus*	Shallow water in marshes, ditches, ponds, salt ponds, or fields.
American Avocet	*Recurvirostra Americana*	Summers on shallow inland lakes; winters on coastal flats.
Greater Yellowlegs	*Tringa melanoleuca*	Summers on subarctic forest bogs, winters on coastal marshes.
Lesser Yellowlegs	*Tringa flavipes*	Summers on subarctic forest bogs, winters on coastal marshes.
Solitary Sandpiper	*Tringa solitaria*	Summers on subarctic boreal bogs, winters on small ponds.
Willet	*Tringa semipalmata*	Summers on coastal marshes; winters on coastal marshes, beaches and mudflats.
Spotted Sandpiper	*Actitis macularia*	Summers along rivers, lakes and seashore; winters along edges of fresh or salt water.
Upland Sandpiper	*Bartramia longicauda*	Prairies and meadows.
Whimbrel	*Numenius phaeopus*	Summers on tundra; winters along fresh or salt water and on agricultural fields.
Marbled Godwit	*Limosa fedoa*	Summers on moist grasslands; winters along coast.

COMMON NAME	SCIENTIFIC NAME	HABITAT
Ruddy Turnstone	*Arenaria interpres*	Summers on high arctic tundra; winters on sandy and rocky beaches.
Red Knot	*Calidris canutus*	Summers on tundra; winters on coastal beaches and mudflats.
Sanderling	*Calidris alba*	Summers on tundra; winters along sandy coasts.
Semipalmated Sandpiper	*Calidris pusilla*	Summers on tundra; winters on tidal flats.
Western Sandpiper	*Calidris mauri*	Summers on tundra; winters on coastal beaches and mudflats.
Least Sandpiper	*Calidris minutilla*	Summers on tundra and bogs near tree line; winters along coastal and inland marshes.
White-rumped Sandpiper	*Calidris fuscicollis*	Summers on tundra near coast; winters on muddy areas near coast.
Baird's Sandpiper	*Calidris bairdii*	Summers on dry tundra; winters on inland and coastal lakes and marshes, mudflats, and grasslands.
Pectoral Sandpiper	*Calidris melanotos*	Summers on wet tundra; winters along grassy marshes.
Dunlin	*Calidris alpine*	Summers on tundra; winters on beaches, coastal mudflats.
Stilt Sandpiper	*Calidris himantopus*	Summers on tundra; winters on ponds and marshes near coast.
Buff-breasted Sandpiper	*Tryngites subruficollis*	Summers on dry arctic tundra; winters on short-grass areas and dry lake margins.
Short-billed Dowitcher	*Limnodromus griseus*	Summers on bogs at northern limit of coniferous forests; winters on coastal mudflats.
Long-billed Dowitcher	*Limnodromus scolopaceus*	Summers just north of tree line; winters on freshwater ponds and marshes.
Common Snipe	*Gallinago gallinago*	Wet meadows, marshes, bogs.
American Woodcock	*Scolopax minor*	Woods and thickets bordered by open areas.
Wilson's Phalarope	*Phalaropus tricolor*	Summers on marshy areas of meadows and lakes; winters along shallow edges of saline lakes.
Red-necked Phalarope	*Phalaropus lobatus*	Summers on tundra ponds near arctic coast; winters at sea.
Red Phalarope	*Phalaropus fulicarius*	Summers on marshy tundra ponds; winters at sea.
Pomarine Jaeger	*Stercorarius pomarinus*	Summers on tundra, winters at sea.
Parasitic Jaeger	*Stercorarius parasiticus*	Summers on tundra, winters at sea.
Laughing Gull	*Leucophaeus atricilla*	Coastal, may wander slightly inland.
Franklin's Gull	*Leucophaeus pipixcan*	Summers on northern prairie lakes; winters on the coast.
Bonaparte's Gull	*Chroicocephalus Philadelphia*	Summers in northern coniferous forests; winters on coasts and inland waterways.
Ring-billed Gull	*Larus delawarensis*	Coasts, lakes, dumps, fields, fast-food locations.
Herring Gull	*Larus argentatus*	Coasts, lakes, dumps, rivers, fields.
Black-legged Kittiwake	*Rissa tridactyla*	Summers on coastal cliffs, winters at sea.
Gull-billed Tern	*Gelochelidon nilotica*	Coastal areas, fields, lakes, marshes.
Caspian tern	*Hydroprogne caspia*	Coasts and inland along rivers and lakes.
Royal Tern	*Thalasseus maximus*	Coast.
Sandwich Tern	*Thalasseus sandvicensis*	Coastal.
Common Tern	*Sterna hirundo*	Lakes, coast.
Forster's Tern	*Sterna forsteri*	Lakes, marshes, coast.
Least Tern	*Sternula antillarum*	Coast and along major rivers.

COMMON NAME	SCIENTIFIC NAME	HABITAT
Sooty Tern	*Onychoprion fuscatus*	Coast.
Black Tern	*Chlidonias niger*	Summers on wet meadows, marshes, ponds; winters on coast and at sea.
Black Skimmer	*Rynchops niger*	Coast.
Rock Dove	*Columba livia*	Cities, parks, bridges, steep cliffs.
White-winged Dove	*Zenaida asiatica*	Suburbs.
Mourning Dove	*Zenaida macroura*	Almost any open habitat, suburbs.
Common Ground-Dove	*Columbina passerine*	Open areas at the edge of vegetation, including suburbs.
Black-billed Cuckoo	*Coccyzus erythropthalmus*	Woods edges, thickets, hedgerows.
Yellow-billed Cuckoo	*Coccyzus americanus*	Open woods, thickets, riparian habitats.
Barn Owl	*Tyto alba*	Open farmlands, grass lands, deserts, and suburbs.
Eastern Screech Owl	*Otus asio*	Woods, swamps, parks, suburbs.
Great Horned Owl	*Bubo virginianus*	Extremely varied; woods, deserts, suburbs.
Burrowing Owl	*Athene cunicularia*	Open plains, grasslands, desert scrub.
Barred Owl	*Strix varia*	Woods, wooded swamps.
Short-eared Owl	*Asio flammeus*	Open fields, marshes, dunes, and grasslands.
Common Nighthawk	*Chordeiles minor*	Forest, plains, urban areas.
Chuck-will's-widow	*Antrostomus carolinensis*	Along edges of coniferous or mixed forests; often along rivers.
Whip-poor-will	*Caprimulgus vociferous*	Open woods, canyons, dry, brushy areas.
Chimney Swift	*Chaetura pelagica*	Rural or urban areas where there are chimneys; more rarely in hollow trees.
Ruby-throated Hummingbird	*Archilochus colubris*	Woods, edges, streams, parks, gardens.
Belted Kingfisher	*Ceryle alcyon*	Near water, such as rivers, lakes, coastal bays.
Red-headed Woodpecker	*Melanerpes erythrocephalus*	Farmlands, open woodlands, suburbs, orchards.
Red-bellied Woodpecker	*Melanerpes carolinus*	Woodlands, parks, suburbs.
Yellow-bellied Sapsucker	*Sphyrapicus varius*	Woods and orchards.
Downy Woodpecker	*Picoides pubescens*	Woods, farmland, suburbs.
Hairy Woodpecker	*Picoides villosus*	Woods, farmland, suburbs.
Red-cockaded Woodpecker	*Picoides borealis*	Mature pine woods.
Olive-sided Flycatcher	*Contopus cooperi*	Northern and mountainous coniferous forests.
Eastern Wood-Pewee	*Contopus virens*	Open woods.
Yellow-bellied Flycatcher	*Empidonax flaviventris*	Dense coniferous woods.
Acadian Flycatcher	*Emphidonax virescens*	Mature deciduous forests, often near water.
Alder Flycatcher	*Empidonax alnorum*	Alder thickets or edge of lakes or swamps.
Least Flycatcher	*Empidonax minimus*	Open woods, orchards, suburbs.
Eastern Phoebe	*Sayornis phoebe*	Woods, farmlands, suburbs; nests on bridges, outbuildings.

Source: Reetz, Personal Communication, 2013; Stokes, 1996.

Table A1-10. Special-Status Species of Baldwin County and/or Gulf State Park.

COMMON NAME	SCIENTIFIC NAME	FEDERAL STATUS	HABITAT/POTENTIAL TO OCCUR IN PROJECT SITES
Mammals			
Alabama beach mouse	*Peromyscus polionotus ammobates*	Endangered	Yes, with critical habitat designated at GSP. Potential to occur in proposed dune restoration area and proposed area for re-establishment of the lodge (dune crossovers).
Perdido Key beach mouse	*Peromyscus polionotus trissyllepsis*	Endangered	Similar habitat as the Alabama Beach Mouse but the species is restricted to Perdido Key. This species is not present in any of the proposed project areas.
West indian manatee	*Trichechus manatus*	Endangered	Found in warm marine environments. This species is not present in any of the proposed project areas. The proposed project areas do not include any open water marine habitat.
Dolphin	*Tursiops truncatus*	Not listed but protected under the MMPA	Open water. This species is not present in any of the proposed project areas. The proposed project areas do not include any open water marine habitat.
Birds			
Piping plover	*Charadrius melodua*	Threatened	Found in sandflats adjacent to passes and inlets, on mudflats near sandy beaches, on overwash sandy mudflats, and on sandy beaches. While the species may be present in the vicinity of the proposed project areas, it is not present in the actual proposed project sites.
Bald eagle	*Haliaeetus leucocephalus*	Recovery	Found along the coast and along major rivers and lakes. While the species may be present in the vicinity of the proposed project areas, it is not likely to be present in the actual proposed project sites.
Wood stork	*Mycteria americana*	Endangered	Although this species uses freshwater swamps to forage in Alabama, the species is not known to nest in the state. This species is not likely to occur in any of the proposed project areas.
Fish			
Alabama sturgeon	*Scaphirhynchus suttkusi*	Endangered	Prefers deep, swiftly moving currents over permanent sand and gravel substrates. This habitat is not present in any of the proposed project areas.
Gulf sturgeon	*Acipenser oxyrinchus desotoi*	Threatened	Viable populations exist in the Choctawhatchee River, Fish River, and Mobile Delta. This habitat is not present in any of the proposed project areas.

COMMON NAME	SCIENTIFIC NAME	FEDERAL STATUS	HABITAT/POTENTIAL TO OCCUR IN PROJECT SITES
Reptiles			
Alabama red-bellied turtle	*Pseudemys alabamensis*	Endangered	Found in shallow vegetated backwaters of freshwater streams, rivers, bays, and bayous in or adjacent to Mobile Bay. They seem to prefer habitats having soft bottoms and extensive beds of submergent aquatic macrophytes. This habitat may be present in areas where the proposed trails would be constructed, particularly in areas that cross aquatic habitat. However, the prevalence of the species in general is very low, and the latest data suggests that the species has not been found east of Bon Secour Bay (which excludes GSP); therefore, the likelihood that this species is in any of the project areas is not very high.
Eastern indigo snake	*Drymarchon corais couperi*	Threatened	Requires deep sand ridges, often near areas inhabited by the gopher tortoise. Found in longleaf pine habitat. This habitat is not present in any of the proposed project areas.
Gopher Tortoise	*Gopherus polyphemus*	Candidate	The best populations in Alabama are found in longleaf, pine-scrub, oak-wiregrass sand hills that are frequently burned. This habitat is not present in any of the proposed project areas.
Loggerhead sea turtle	*Caretta caretta*	Threatened	Normally associated with waters along the continental shelf, and found in many coastal and estuarine areas. Most abundant sea turtle occurring in the coastal waters and nesting on the beaches of Alabama. This species would not occur within any of the proposed project areas, but may occur on the beaches adjacent to the proposed sites for the re-establishment of the lodge, dune restoration, and interpretive center.

Kemp's Ridley sea turtle	*Lepidochelys kempii*	Endangered	Well-known for inhabiting and feeding in the coastal and estuarine waters of the entire Gulf of Mexico and Atlantic Coast of the United States. This species would not occur within any of the proposed project areas, but may occur on the beaches adjacent to the proposed sites for the re-establishment of the lodge, dune restoration, and interpretive center.
Green sea turtle	*Chelonia mydas*	Endangered	Often found in relatively shallow coastal or bay waters, except when migrating. Appear to prefer protected bays, lagoons, or shoals with an abundance of algae or marine grass beds. Feed along the Atlantic and Gulf Coasts. Normally nest on beaches with high-energy wave action, including many islands. This species would not occur within any of the proposed project areas, but may occur on the beaches adjacent to the proposed sites for the re-establishment of the lodge, dune restoration, and interpretive center.
Leatherback sea turtle	*Dermochelys coriacea*	Endangered	Coastal waters, but often found in open ocean and appears well-adapted to a pelagic existence. Occasional nesting occurs in the eastern Gulf of Mexico on the Florida Panhandle. This species would not occur within any of the proposed project areas, but may occur on the beaches adjacent to the proposed sites for the re-establishment of the lodge, dune restoration, and interpretive center.
American Alligator	*Alligator mississippiensis*	Threatened	Found throughout their range in freshwater swamps, marshes, rivers, lakes and streams. They prefer water sources that do not go dry in the summer months and that provide an abundance of food. This habitat may be present in areas where the proposed trails would be constructed, particularly in areas that cross aquatic habitat.
Bivalves			
Heavy pigtoe mussel	*Pleurobema taitianum*	Endangered	Moderate to large rivers with moderate to swift current. Its preferred habitat is riffle-run or shoal areas with stable substrates ranging from sandy gravel to gravel-cobble. This habitat is not present in any of the proposed project areas.

Inflated heelsplitter mussel	*Potamilus inflatus*	Threatened	The preferred habitat of this species is soft, stable substrata in slow to moderate currents. The habitat range of this species is outside of the proposed project areas, and suitable habitat is not present.
Amphibians			
Flatwoods salamander	*Ambystoma cingulatum*	Endangered	Pine flatwoods. Larvae found in shallow pond cypress or blackgum ponds, marshy pasture ponds, roadside ditches, or small, shallow borrow pits. Not documented in Alabama in over two decades despite surveys from 1992 to 1995. This species is not likely to occur in the proposed project area due to lack of suitable habitat and general lack of occurrence in the areas.
Flowering Plants			
American chaffseed	*Schwalbea americana*	Endangered	Natural communities which could support American chaffseed include mesic pine flatwoods, pine/scrub oak sandhills, pine savannas, and Sandhills Seeps. The present distribution is restricted to just five states: Florida, Georgia, North Carolina, South Carolina and New Jersey. This is species is not likely to occur in the proposed project area due to general lack of occurrence within the state.

Source: Reetz, Personal Communication, 2013; USFWS, 2013; and Alabama Department of Conservation and Recreation, 2013

11.8 Alabama Oyster Cultch Restoration: Project Description

11.8.1 Project Summary

The proposed Alabama Oyster Cultch project would enhance and improve the oyster populations in the estuarine waters of Alabama. The project would place approximately 30,000 – 40,000 cubic yards of suitable oyster shell cultch over approximately 319 acres of subtidal habitat in Mobile County, AL, in proximity to other oyster reefs currently managed by the Alabama Department of Conservation and Natural Resources (ADCNR) and within the historic footprint of oyster reefs in the area. The estimated cost for this project is $3,239,485.

11.8.2 Background and Project Description

The objective of this project is enhancing oyster biomass through the selective placement of approximately 30,000 – 40,000 cubic yards of cultch over approximately 319 acres in the estuarine waters of the State of Alabama in Mobile County. Cultch plants promote the settlement and growth of oyster spat and have proved to be successful in producing new oysters in the State of Alabama. These planned oyster reefs would be in proximity to other reefs that are currently managed by Alabama Department of Conservation and Natural Resources (ADCNR) and would be within the historic footprint of oyster reefs in the area. Placement of cultch material would be selected by season and surveys to determine where environmental conditions are favorable for spat settlement and survival.

11.8.3 Evaluation Criteria

This project was submitted by the public as an Early Restoration project generally and meets the evaluation criteria for the Framework Agreement and Oil Pollution Act (OPA). The project would restore injured oyster reefs and/or partially compensate for interim losses of such natural resources within Alabama for impacts caused by the Spill. Thus, 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). The project would be implemented by the ADCNR in coordination with the other Trustee partners. ADCNR has a long-standing oyster cultch restoration program and would utilize proven techniques with established methods and documented results. Additionally, monitoring and management of the oyster resources would ensure the likelihood of success of this and future oyster bed restoration in Alabama waters. Therefore, the project is technically feasible and carries a high probability of success (see C.F.R. § 990.54(a)(3) and Section 6e of the Early Restoration Framework Agreement). Cost estimates are based on similar past projects executed by ADCNR in comparable areas, and the project can be conducted at a reasonable cost and implemented by the Trustee with minimal delay. As a result, the project is considered feasible, cost effective, and consistent with long-term restoration needs (see C.F.R. § 990.54(a)(1),(3),(4) and Sections 6d-6e of the Early Restoration Framework Agreement).

11.8.4 Performance Criteria, Monitoring and Maintenance

Project performance would be assessed through physical and biological monitoring of oyster cultch plants conducted by ADCNR. The monitoring program would determine whether the project goals and objectives have been achieved. Biological monitoring would occur for the life of the project and would include typical oyster metrics (e.g., density, size, and spat settlement).

Oyster cultch plant maintenance would likely consist of cultch replenishment, as necessary. Cultch material may be lost over time due to weather events, harvest activity, etc. Mid-course enhancements would include additional cultch placement in areas of cultch loss. Once clean oyster cultch has been planted and larval oysters become attached, monitoring will take place to document growth and mortality rates.

11.8.5 Offsets

For the purposes of negotiations of Offsets with BP in accordance with the Framework Agreement, the Trustees used Resource Equivalency Analysis to estimate Offsets for the Alabama Oyster Cultch Restoration Project. Oyster Secondary Productivity Offsets (expressed in ash-free-dry-weight DKg-Ys) were estimated for expected increases in oyster biomass (tissue) 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 578,000 DKg-Ys of Oyster Secondary Productivity, applicable to Oyster Secondary Productivity injuries in Alabama, as determined by the Trustees' total assessment of injury for the Spill. In the event the aforementioned Offsets are in excess of the injury to oysters in Alabama, any remaining Offsets for oyster secondary productivity would be applicable to injury to benthic secondary productivity (defined as the net production of mobile and sessile invertebrate infauna and epifauna associated with hard bottom substrate) injuries in Alabama state waters. These Offset types and amounts are reasonable for this project.

11.8.6 Cost

The total estimated cost to implement this project is $3,239,485. 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.

11.9 Alabama Oyster Cultch Restoration: Environmental Review

The proposed Oyster Reef Restoration in Mobile County, Alabama Project would place approximately 30,000 – 40,000 cubic yards of suitable oyster shell cultch over approximately 319 acres of subtidal habitat in Mobile County, Alabama, near other oyster reefs currently managed by the Alabama Department of Conservation and Natural Resources (ADCNR) (Permit no. SAM-2012-1009-DEM). This project would be located within the footprint of historical reefs and would provide ecological restoration and deliver ecosystem services that were impacted as a result of the Deepwater Horizon (DWH) oil spill. The estimated cost for this project is $3,239,485.

The objective of this project is to enhance oyster biomass through the selective placement of oyster cultch in Alabama's estuarine waters. Cultch placements promote the settlement and growth of oyster spat and have been successful in producing new oysters in Alabama. The planned oyster reefs would be near other reefs currently managed by ADCNR and within the historic footprint of existing oyster reefs. Placement of cultch material would be selected by season and surveys would be conducted to determine favorable environmental conditions for spat settlement and survival.

11.9.1 Introduction and Background

Oyster reef restoration was suggested as a restoration measure during the Trustee Council public scoping meetings for the Deepwater Horizon programmatic environmental impact statement (PEIS), and also submitted as a restoration project(s) by the public. The proposed project, described under section 11.4.2, would compensate for interim losses of such natural resources within Alabama state waters, including impacts on oysters exposed to oil, dispersant, and/or response activities undertaken to prevent, minimize, or remediate oiling from the Spill.

11.9.2 Project Location

The proposed project is located in Mobile County, Alabama, in the estuarine waters of Mobile Bay and Mississippi Sound within the footprint outlined below (see Figure 11-23). Exact project area within the shown footprint would be determined by factors that influence the project's likelihood of success (e.g., salinity, rainfall, and season). It is located north of Dauphin Island and south of Mon Louis Island. Alabama State Roads (SR) 188 and 193 would be the primary roadways used to access shoreline areas adjacent to the proposed project site for boat launching. The city of Mobile, Alabama is approximately 33.5 miles from the proposed project site. Nearby communities include Bayou La Batre, Grand Bay, Theodore, Dauphin Island and Tillman's Corner.

Figure 11-23. Proposed project location.

11.9.3 Construction and Installation

Construction activities would include planting of oyster cultch, which may be oyster shell processed at local shops, quarried fossilized oyster shell from states across the Gulf region, or rock aggregate such as limestone and calica. Planting of oyster cultch could occur twice over a one year period, once in the fall and once in the spring, assuming suitable conditions are present. Each planting would last approximately five days. This work would be performed by a contractor and include standard placement practices via shallow draft barge and/or small boat, with materials dispersed using a water cannon at an approximate density of 50 to 150 cubic yards per acre. Implementation of the proposed project would be determined based on seasonal surveys to determine where environmental conditions are favorable for spat settlement and survival.

Placement of cultch material would be located near existing and historic public oyster reefs (areas of historic oyster reefs) which are located between the -3.0 to -7.0 feet MLLW contour and include approximately 319 acres of existing subtidal oyster reef in the Lower Mobile Bay and Mississippi Sound. It is anticipated that approximately 30,000 to 40,000 cubic yards of cultch material would be distributed across the proposed project area.

Preliminary details of the preferred construction methods identified to date are discussed below. These methods would be further refined closer to the implementation of the proposed project and outlined in a construction/implementation action plan.

Origin of Cultch Material. Because there are a variety of materials suitable for use as cultch, the bottom type in the project area would be assessed to select the material that would result in the least amount of cultch loss due to sinking through sediment or silting. A particular cultch type would also be identified in project documents as the proposed project is further refined.

Natural oyster shell is preferred if it is available and affordable within the constraints of the estimated project budget. Oyster shell may be from shucked oysters collected from oyster dealers or restaurants by the contractor. Contractors stockpile oyster shell from Alabama or any other state where it is economically feasible to collect resources. Buried oyster shell may be found at some quarries and may be considered as a possible substitute for oyster shell from restaurants and processors, depending on composition and availability. Currently, there is only one company that supplies buried oyster shell as a cultch source. Other common cultch materials include #57 limestone, calica, crushed granite, clam shell, and crushed concrete aggregate. Some of these materials may be purchased locally and potential use of these materials would depend on cultch preference and availability on a project to project basis. For this project, it is anticipated that cultch material would be purchased from local oyster processing facilities as has historically occurred during past cultch placement projects.

Transport of Cultch Material to the Project Site. The contractor could transport cultch material to the proposed project site in numerous ways. The following provides an overview of potential methods. This component of the proposed project would be further refined prior to project initiation in a construction/implementation action plan.

Dump trucks could pick up cultch material from local processing facilities. These trucks would be loaded utilizing front-end loaders or similar equipment. The material would then be transported dockside and stored there until there is enough to load it onto barges for transport to the project site. Quarried cultch products, such as limestone and other aggregates, may be loaded by hopper and barged directly to the site.

Once at the site, oyster cultch is generally loaded onto one or multiple barges by a skid steer loader or track excavator and transported via a tug or push boat to the planting site. Between two and six barges can be brought to the planting site with a push boat. These boats stay off the reef site. Generally, two to three barges in addition to a water cannon barge are deployed over the planting site.

ADCNR would conduct pre-surveys of the project site to determine:

1. bottom type—which should be hard enough to support cultch material;
2. proximity to existing live oyster resources—to determine suitability for settlement, growth, and survival of oysters; and
3. additional surveys that may include gillnet sets, quadrat dives, hand dredging, and additional cane pole sounding.

ADCNR representatives would mark the planting site with buoys and measure the barge loads on site. Cultch may be planted using high pressure water pumps to blow it off the barge, skid steers, or other industrial equipment. Push boats would be used to move the barges around the project site to ensure even distribution of the cultch.

In more shallow locations, barges may be light-loaded and use shallow draft push boats to access these areas, or smaller vessels would be used. Small planting vessels may include tonging skiffs (10 to 20 feet), dredge skiffs (15 to 35 feet), and small shrimping vessels (15 to 35 feet). If small boats are used for final deployment (in depths of less than 3 feet), skid steers would load cultch from the barge onto small planting vessels. These small vessels would then transport the cultch to the shallow water site and the cultch would be pushed overboard using hand tools or high-pressure water spray from on-board wash down pumps. Light loading and planting with small vessels could increase the number of working days and cost to complete a project.

Vehicle and Barge Operation. The following assumptions about vehicle and barge operation for the implementation of the proposed project are based on the last two planting operations conducted by ADCNR. It is anticipated that between four and eight barges filled with material would be deployed in a single day. A work day would range between 8 and 14 hours, depending on the distance from the origin to destination point and the number of barges being used. This also includes time for ADCNR representatives to measure barge loads at the project site, deployment, and reloading of barges for deployment the following day. Skid steers and/or excavators would be used for reloading and hoppers may be used for quarried materials.

On a daily basis, the implementation of the proposed project would include the use of two skid steers for approximately 4 hours; two excavators for approximately 4 hours; two push boats for 6 to 8 hours; six unpowered barges for 6 to 8 hours; and two to four diesel-powered pumps for six high pressure hoses for 6 to 8 hours. Contractors retained for this component of the proposed project would provide the industrial equipment for loading and unloading cultch.

Duration and Timing of Construction. The time required to implement the proposed project depends on the amount of cultch required, capability of contractor (e.g., equipment available and experience of personnel including loading machine operators and push boat captains), and method of deployment (blow off or small boat planting). Each barge may deploy approximately 4,000 cubic yards in about 3 days but small vessels may take 4 or 5 days to deploy the same amount of cultch. New cultch may be added to the project twice during the implementation year, once in the spring and once in the fall. Ideally this would occur during peak larval production between April and May and between September and October. Spawning continues throughout the summer months and even to a limited degree in the winter. The spring spawning peak is triggered when water temperature increases to 20°C and the fall spawning peak begins when there is a sharp decline in water temperature.

11.9.4 Operations and Maintenance

ADCNR would conduct monitoring of oyster growth and density to determine growth success and viability. They would conduct annual scuba dive monitoring in late summer and would collect additional

dredge samples to determine if additional dives are necessary. The following provides an overview of survey methods that would likely be used to determine how the reef is growing. Any one or combination of these methods may be employed.

Quadrat Surveys. Transect lines with 10 randomly spaced bags would be deployed. Divers would then swim along the transect line placing one square yard quadrats next to each bag. All oysters and cultch material found in the quadrant would then be bagged, with each bag representing one sample. These samples would measure large oysters (3 inches and greater), small oysters (between 2 and 3 inches), and spat (from 0 to 2 inches) and count half shells, boxes, and oyster drills. All material would then be returned to the reef from where it was collected. This type of survey is generally performed on an annual basis in early August. Additional surveys may be conducted throughout the year on sites of interest, including those areas where recently planted oyster reefs are located.

Hand Dredge. Dredge would be towed from a vessel in a circular fashion at 2 to 3 knots for an average of 90 seconds. Once the sample is retrieved on deck of the vessel, a sampler would count large oysters, small oysters, spat, half shells, boxes, and drills. All material would then be returned to the reef from where it was collected.

Cane Pole Sounding. A sampler would detect bottom type and sediment depth by tapping bottom sediments with a cane pole or piece of PVC. When used in conjunction with a GPS device, the extent of substrate type (reef) would be determined.

Gill Net Sampling. Gill nets could be deployed to survey fin fish density and species diversity.

Post-deployment surveys may include some or all of the above survey methods. Traditionally, ADCNR performs annual quadrat dives in early August of each year. Additional quadrat surveys may be included throughout the year on sites of interest including monitoring of recently planted oyster reefs. At least one additional quadrat survey and two or three hand dredge surveys within a year is a reasonable estimate of post-deployment survey operations.

If monitoring indicates the presence of excessive algal growth, cultch may be cultivated (tilled) using a bagless commercial dredge or other cultivating equipment. Bottom type, oyster density, silting, and fouling all play a role in determining suitability to cultivate. The optimal time to cultivate coincides with the optimal time to plant cultch (Spring = April/May, Fall = September/October). The goal is to de-foul and expose the cultch surface for oyster settlement so cultivating at these times increases the probability of contact between larvae and cultch.

The proposed project is expected to last approximately 10 years after harvesting begins. Although not included in the funding for this project, additional cultch may be planted in these areas because the cultch loses its effectiveness over time.

11.9.5 No Action

Both OPA and NEPA require consideration of the No Action alternative. For this Draft Phase III ERP proposed project, the No Action alternative assumes that the Trustees would not pursue the Alabama Oyster Cultch Project as part of Phase III Early Restoration.

Under No Action, the existing conditions described in Chapter 3 would prevail. Restoration benefits associated with this project would not be achieved at this time.

11.9.6 Affected Environment and Environmental Consequences

11.9.6.1 Physical Environment

11.9.6.1.1 Geology and Substrates

Affected Resources

The sediment of Mobile Bay ranges from sand to clays with various mixtures of sand, silt, and clay covering most of the bay bottom. The Mobile Bay sediments are approximately 50 percent sand and 50 percent clay as described by the Navy (1986). The northern portion of the bay is comprised of deltaic sands, silty sands, silts, and clayey silts carried in by the Mobile River. Sediments of the lower bay are primarily estuarine silty clay and clay. The western shoreline exhibits sands which grade to clayey sand, sandy clay and clays towards the deeper parts of the bay (USACE 1985). The proposed project would be located within historical reef areas off of the coast of Mobile County, Alabama. These historical reefs consist primarily of a hard reef substrate composed of shells, limestone, or concrete and a small amount of soft sediments including sand, silt, and clay. However, there is an abundance of soft bottom substrate in Mobile Bay (USACE 1985). The area is a low risk area for seismic activity (USGS 2012).

Environmental Consequences

Implementation of the proposed project via barge blow off would deploy around 5,000 cubic yards of cultch in about 3 days per average vessel or would take 4 or 5 days to deploy with small vessels for each of the two planting events. The peak oyster larval production periods are between April and May or September and October; therefore, these times are preferred for proposed project implementation. During project implementation, the use of high water pressure pumps, skid steers, or other industrial equipment may be used to distribute cultch off barges directly onto the site to ensure the even distribution of the cultch. This would likely result in temporary increases in suspended sediment in and around the proposed project site. However, based on monitoring during past ADCNR restoration activities, it is anticipated that particles would settle out within a few hours of placement and return to existing conditions. Therefore, any impacts from implementation would be small and localized, and not result in permanent changes, resulting in short-term, minor adverse impacts.

Direct impacts on geology, soils, and sediments as a result of the proposed project are anticipated to be adverse, but localized, and minor because the oyster cultch material would be distributed primarily within the existing footprint of historic oyster reefs. Although it would add to the bottom surface, it would not generally alter the nature of the ocean bottom as this area historically has been covered with oyster reef. In places, however, it could potentially replace a minimal amount of soft sedimentary substrates. These minimal impacts would not be problematic since soft sediments are not a scarce resource in this area. Low seafloor profile alterations, of approximately 1 to 6 inches above the existing substrate, would also result from the proposed project. This profile alteration would be intended to minimize displacement of cultch material by currents and result in beneficial impacts by reducing the movement of sediment and stabilizing the seafloor during storm events. As oysters grow, the vertical

height of the hard bottom reef would increase over time in conjunction with their rate of growth. The overall increase in height of the reef is dependent upon rate of harvest, nutrients for growth, water temperature, natural predation and storm events (NOAA 2007).

Because the proposed project would generally occur on historic reef areas that do not contain soft sedimentary substrates and the use would be consistent with historical and adjacent uses, impacts would be small and localized and permanent changes to the existing geology would not occur. Therefore, impacts during operation would be adverse but short-term, localized, and minor.

11.9.6.1.2 Hydrology and Water Quality

Affected Resources

The proposed project would be located in the estuarine waters of Mobile Bay and Mississippi Sound (Figure 11-23). These resources are waters of the State of Alabama.

Water Quality

Water quality in the area is generally good. Turbidity in the project area, as well as most of the Bay, is a common occurrence due to shallow depths, silts, windy conditions, and storm events.

Because the proposed project site itself is located in open water, with minimal staging areas on already developed land areas, there would be no impacts to hydrology, tides, and currents, wetlands, SAV, floodplains or groundwater; therefore these resources are not discussed in detail.

Environmental Consequences

Water Quality

During implementation, the restoration of approximately 319 acres of historic oyster reef in the estuarine waters of Alabama through the selective placement of cultch material could result in temporary increases in local turbidity and suspended sediment concentrations in the water column. These adverse effects would be minor, localized, and short term as particles would settle out within a few hours of placement and any impacts would quickly be undetectable. Once the proposed project is complete and oysters are established within the project area, beneficial, long-term indirect effects on water quality are expected as a result of increased filtration capacity from the newly established bivalves, which would increase water clarity. This filtration is accomplished through the feeding process. Oysters feed by pumping water through their gills and filtering out plankton and other particles (Nature Conservancy 2011).

A Nationwide Permit 48 for shellfish aquaculture has been issued by the U.S. Army Corps of Engineers (USACE) for the placement of oyster cultch materials on existing reefs in Mobile Bay and Mississippi Sound. This permit authorizes “discharges of dredged or fill material in waters of the United States […] for the continued operation and/or expansion of existing commercial shellfish aquaculture operations […]” (NMFS 2012). The project would be within the boundary of the permitted area.

The Alabama Department of Environmental Management (ADEM) has granted certification in accordance with Section 401(a)(1) of the Clean Water Act (CWA) (33 U.S.C. § 1251, *et. seq.*) to ADCNR that there is reasonable assurance that any discharge that may result from the proposed project would not violate applicable water quality standards under Section 303 of the CWA and Section 22-22-9(g) of the Code of Alabama (1975). The ADEM has further certified that there are no applicable limitations or standards under Sections 301, 302, 306, or 307 of the CWA. Any project that has the potential to impact Alabama's coastal resources is subject to ADEM's Coastal rules (ADEM 2013a). This includes projects impacting water bottoms or wetlands. Coastal Zone Management concurrence was included as a part of the Nationwide Permit 48 for this project. In accordance with all applicable permit conditions, best management practices (BMPs), including monitoring by ADCNR, would be implemented throughout the duration of the proposed project. Monitoring would include quadrat surveys, hand dredging, cane pole sounding, and gill net sampling to determine oyster growth and density, substrate types, and fish density and species diversity. These methods are described in detail in section 11.61.4 of this document. During implementation of the proposed project, direct impacts would be localized, short-term, and minor because anticipated increases in water column turbidity are anticipated to dissipate within a few hours. During operation of the restored reef, long-term impacts to water quality would also be localized and beneficial due to the added filtration capacity of oysters which would result in detectable changes to water quality that are small and localized.

11.9.6.1.3 Air Quality and Greenhouse Gas Emissions

Affected Resources

Air resources that may be impacted by the proposed project include resources in the Mobile County area. The U.S. Environmental Protection Agency (U.S. 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 U.S. EPA has promulgated National Ambient Air Quality Standards (NAAQS). The NAAQS include primary standards which set limits to protect public health, including the health of "sensitive" populations such as asthmatics, children, and the elderly. To date, the U.S. EPA has issued NAAQS for seven criteria pollutants: carbon monoxide (CO), sulfur dioxide (SO2), particles with a diameter less than or equal to a nominal 10 micrometers (PM10), particles with a diameter less than or equal to a nominal 2.5 micrometers (PM2.5), ozone (O3), nitrogen dioxide (NO2), and lead (Pb). Individual states may promulgate their own ambient air quality standards for these "criteria" pollutants, provided that they are at least as stringent as the federal standards. In Table 11-23, below, both State of Alabama and federal primary ambient air quality standards for criteria air pollutants are presented.

Table 11-23. State and federal ambient standards for criteria air pollutants.

POLLUTANT	AVERAGING PERIOD	FEDERAL PRIMARY STANDARD	ALABAMA STATE STANDARD
Ozone	8-hour	0.075 ppm	Same as Federal
PM2.5	Annual (arithmetic mean)	15.0 µg/m3	Same as Federal
	24-hour	35 µg/m3	Same as Federal
PM10	24-hour	150 µg/m3	Same as Federal
Carbon Monoxide	8-hour	9 ppm	Same as Federal

	1-hour	35 ppm	Same as Federal
Nitrogen Dioxide	Annual (arithmetic mean)	0.053 ppm	Same as Federal
	1-hour	0.100 ppm	Same as Federal
Sulfur Dioxide	1-hour	75 ppb	Same as Federal

ppm = parts per million
ppb = parts per billion
Source: EPA, 2012a.

The Mobile area is currently in attainment with National Ambient Air Quality Standards (NAAQS) required by the U.S. Environmental Protection Agency (USEPA) (40 C.F.R. Part 50) (USEPA 2012b).

Criteria air pollutants and greenhouse gas (GHG) emissions are largely generated by electricity production, vehicular movements, and commercial and residential buildings using electricity, among other sources. GHG emissions would result from both the implementation and operation of the proposed project from the use of vessels during cultch placement and for monitoring activities.

Environmental Consequences

During implementation, the proposed project would involve the use of material haul trucks, barges, and other large equipment. Estimated daily vehicle use would include two skid steers for 4 hours; two excavators for 4 hours; two push boats for 6 to 8 hours; six unpowered barges for 6 to 8 hours; and two to four diesel-powered pumps for six high pressure hoses for 6 to 8 hours.

Exhaust generated from this equipment would result in short-term and localized contributions to air pollution and GHG emissions. Although it is difficult to develop an accurate estimation of total fuel consumption associated with construction vehicle and equipment operation, an estimate of GHG emissions was based on the number of hours each piece of construction equipment would be in use (Table 11-24). Without information regarding engine size and model year, it was estimated that the push boats would have an engine size comparable to that of a bulldozer, and the pumps would use large diesel engines comparable to a dump truck. The estimate was conducted using CO2 emission factors calculated from the U.S. Department of Energy and CH4 and N2O emission factors from U.S. EPA.

In addition to GHG emissions, there is the potential for particulate matter associated with oyster cultch deposition to become temporarily airborne during the placement process. Inhaling particulate matter has the potential to adversely affect humans and wildlife; however, these effects are unlikely due to the short-term and localized nature of the potential impact. Overall, the implementation of the proposed project is anticipated to result in short-term and minor impacts on air quality and GHG emissions as impacts would be localized and temporary, and would not exceed the U.S. EPA's *de minimis* criteria for a general conformity determination per event or with the two events combined. Because of the scale of the proposed project and duration of implementation, these effects are not anticipated to contribute adversely to the region's overall air quality.

Table 11-24. Greenhouse gas impacts of the proposed project per planting event (two events planned).

EQUIPMENT	CO2[1] (METRIC TONS)	CH4 (CO2E) (METRIC TONS)	N2O (CO2E) (METRIC TONS)	TOTAL CO2E[2] (METRIC TONS)
Tugboat (2)	3.2	0.9	12.5	16.6
Skid Steer (2)	1.8	0.5	7.1	9.4
Excavator (2)	1.8	0.5	7.1	9.4
Diesel Pump (3)	1.8	0.5	7.6	9.9
TOTAL	**8.6**	**2.4**	**34.3**	**45.3**

[1] CO2 emission factors calculated from DOE and EIA 2005. CH4 and N2O emission factors from U.S. EPA 2007.
[2] CH4 and N2O emissions have been converted into units of equivalent carbon dioxide (CO2e) using the IPCC global warming potential (GWP) factors of 21 GWP for CH4 and 310 GWP for N2O (ICBE 2000).

The Air Division is responsible for administering ADEM's Air Pollution Control Program as authorized by the Alabama Environmental Management Act (Ala. Code §§ 22-22A-1 to 22-22A-16) and the Alabama Air Pollution Control Act (Ala. Code §§ 22-28-1 to 22-28-23). The Air Division is also responsible for administering delegateable provisions of the Clean Air Act (ADEM 2013b). Chapter 335-3 of ADEM's administrative code serves as the State of Alabama's State Implementation Plan as required by the USEPA for tracking NAAQS. The air permit section of the code (chapter 335-3-14) requires that any "person building, erecting, altering, or replacing any article, machine, equipment, or other contrivance, the use of which may cause the issuance of or an increase in the issuance of air contaminants or the use of which may eliminate or reduce or control the issuance of air contaminants, shall submit an application for an Air Permit at least 10 days prior to construction" (ADEM 2013c). Air quality permits are not required for this type of project because it does not meet any of the criteria that would require a permit. Applicable air quality criteria can be found at:
http://www.adem.state.al.us/alEnviroReglaws/files/Division3.pdf

While any potential adverse impacts for NAAQS pollutants would be expected to be minor, local, and short-term in duration as described above, BMPs would be employed to prevent, mitigate, and control impacts on air quality during implementation of the proposed project. This would include practices such as the use of equipment that meets air quality standards as well as following appropriate equipment operation standards during implementation of the proposed project. Short-term emissions of GHGs would also have adverse but minor impacts due to their small contribution relative to overall GHGs.

Over the long term, vessels traveling to the project site for monitoring, maintenance, and harvesting activities would increase air particulates and GHG emissions in the area. However, the proposed restoration area is located in an area already being utilized for oyster reefs and it is expected that harvesting would be done in part by existing boats in the area, and would not result in a substantial increase in vessel traffic. Because the project is located within an attainment area and is small in scale, it is not anticipated that vessels accessing the area to collect oysters or for maintenance and monitoring activities would increase hazardous air particulate levels that would result in exceedances of established

thresholds; therefore impacts during operation would be adverse but short-term and minor. No indirect effects on air quality are anticipated as a result of the implementation of the proposed project.

11.9.6.1.4 Noise

Affected Resources

Current sources of noise in the vicinity of the proposed project include vessel traffic associated with harvesting of nearby oyster beds and marine recreation.

Environmental Consequences

Implementation of the proposed project would use material haul trucks, barges, and other large equipment for each of the two planting events. Estimated daily use of vehicles during construction for each operation would include two skid steers for 4 hours; two excavators for 4 hours; two push boats for 6 to 8 hours; six unpowered barges for 6 to 8 hours; and two to four diesel-powered pumps for six high pressure hoses for 6 to 8 hours. Construction activities would result in noise in and around the project site during the implementation. While this noise would have the potential to impact wildlife in the area, these impacts would occur only during the initial cultch placement process and would therefore be short-term (up to five days depending on the size of vessel utilized). Impacts on humans would be unlikely due to the distance of the proposed project from potential receptors. Therefore, impacts during implementation would be adverse but short-term and minor. The activities would attract attention, but their contribution to the soundscape would be localized and would not affect the activity of other users in the area.

During operation of the oyster reef, while vessels would be used for oyster collection, maintenance, and monitoring, these vessels would not have any noticeable incremental increased impact to noise in the area because oyster harvest activities are already occurring in the area and are a part of the existing acoustic environment. Therefore, impacts during operation would be adverse but short-term and minor. The ongoing vessel use would attract attention, but the contribution to the soundscape from these vessels would be localized, would not affect the activity of other users in the area, and would be consistent with ongoing and existing uses in the area. No indirect effects on the acoustic environment would be anticipated as a result of the implementation of the proposed project.

11.9.6.2 Biological Environment

11.9.6.2.1 Living Coastal and Marine Resources

Affected Resources

Biological resources with the potential to be affected by the proposed project include coastal and nearshore resources of Mobile County, Alabama that occur within and near Lower Mobile Bay and Mississippi Sound. The biological resources in this area consist of a diverse group of marine and benthic species and ecologically valuable habitats including oyster reefs. The reefs are subtidal in nature, and form aggregates that are common in Mobile Bay and Mississippi Sound. The proposed project would occur on approximately 319 acres in Lower Mobile Bay and Mississippi Sound within areas of historic oyster reefs. The project footprint is a small portion of the much larger ecosystem.

Submerged Aquatic Vegetation

Submerged aquatic vegetation (SAV) consists of rooted vascular plants that grow in fresh, brackish, and saltwater. SAV beds provide important foraging grounds and nursery habitat for many species in the Gulf of Mexico including nearly all managed fisheries. However, a 2009 evaluation of SAV in Mobile Bay, conducted for the Mobile Bay National Estuary Program concluded that no SAVs are present in the proposed project area (Figure 11-24). The absence of SAV in the proposed project area indicates that there would be no impacts to SAV or associated biological resources as a result of this project.

Benthic Invertebrates

Benthic invertebrate communities include infauna (aquatic animals that live in the substrate of the sea bottom) and epifauna (animals that 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., oysters, shrimp, and crabs) are also commercially important. Sponges, mollusks, arthropods (including crustaceans) and polychaetes are all important taxa and contribute substantially to benthic biomass. These taxa include many species, such as oysters, that are filter feeders. Filter feeders remove and digest phytoplankton and particulate organic matter, and deposit processed materials to the substrate (Felder and Camp 2009).

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 over 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 provide a number of ecosystem services including improved water clarity, sediment stabilization, and nutrient sequestration. In coastal Alabama, oysters are important as a commercially harvested species. Oyster reefs along the Gulf Coast also provide nursery and foraging habitat for other economically and ecologically important species including blue crabs, shrimp, and various fish species. Currently, threats to oyster populations include loss of hard bottom habitat, degradation of water quality, predation (primarily by the Atlantic oyster drill *Urosalpinx cinerea*), and disease (primarily dermo).

Alabama Department of Conservation and Natural Resources (ADCNR), Marine Resources Division is responsible for the management of Alabama's oyster reefs. Harvest is also regulated by the Alabama Department of Public Health. The total public reefs including historically harvested reef footprints cover approximately 5,300 acres which includes reefs in Mississippi Sound and Portersville Bay.

In Alabama, private oyster beds adjacent to riparian and leased areas are harvested commercially. The area of the riparian and leased water bottoms in which these private, commercially harvested, oyster beds are found currently totals approximately 870 acres. Alabama's public oyster reefs are open seasonally to commercial and recreational harvest. Commercial harvest requires the harvester to have

an annual oyster catcher's license. Oysters may be harvested recreationally without obtaining a permit or fishing license. Recreational harvesters are limited to 100 3" oysters per person per day and may harvest only in areas opened to commercial harvest. Harvest methods and practices are closely regulated by the state (ADCNR 2013).

Sustainable harvest requires a balance between recruitment of juvenile oysters and removal of harvest size oysters. The sustainable harvest threshold for an oyster reef may also vary due to environmental stressors such as predation, drastic changes in salinity due to flood or drought conditions, and storm events. To ensure the sustainability of Alabama's public oyster reefs, ADCNR incorporates size and take limits, restrictions on harvesting gear and equipment, and harvest seasons to allow natural recovery between harvests. Additionally, all commercial oyster harvesters in Alabama are required to purchase an oyster catcher's license annually through ADCNR Marine Resources Division. Oysters may be harvested recreationally without obtaining a permit or fishing license. Recreational harvesters are limited to 100 3" oysters per person per day and may harvest only in areas opened to commercial harvest (ADCNR 2013).

Essential Fish Habitat:

The 1996 amendments to the Magnuson-Stevens Act set forth a mandate for NMFS, regional Fishery Management Councils (FMC), and other federal agencies to identify and protect EFH of economically important marine and estuarine fisheries. To achieve this goal, suitable fishery habitats need to be maintained. EFH in the project's area of effect is identified and described for various life stages of 55 managed fish and shellfish (GMFMC 1998). A provision of the Magnuson-Stevens Act requires that FMC's identify and protect EFH for every species managed by a Fishery Management Plan (FMP) (U.S.C. 1853(a)(7)). There are FMP's in the Gulf region for shrimp, red drum, reef fishes, coastal migratory pelagics, and highly migratory species (e.g., sharks). Table 11-25 presents the EFH within the vicinity of the proposed project.

EFH is separated into estuarine and marine components. The estuarine component is defined as, "all estuarine waters and substrates (mud, sand, shell, rock and associated biological communities), including the sub-tidal vegetation (grasses and algae) and adjacent inter-tidal vegetation (marshes and mangroves)," (Generic Amendment Number 3 for Addressing Essential Fish Habitat Requirements, Habitat Areas of Particular Concern, and Adverse Effects of Fishing in the following Fishery Management Plans of the Gulf of Mexico, Gulf of Mexico Fishery Management Council, March 2005). The proposed project is within a near-shore estuarine system; there is no marine component to this project. Estuarine fishes include species that inhabit the estuary for part of their life cycle and are commonly associated with SAV beds (absent at proposed site), oyster reefs, and unvegetated soft bottom habitats.

Table 11-25. EFH within the vicinity of the proposed Oyster Restoration Project in Mobile County, Alabama.

Management Unit / Species	Lifestage(s) Found at Location	FMP
Red Drum (*Sciaenops ocellatus*)	ALL	Red Drum
Highly Migratory Species Scalloped Hammerhead Shark (*Sphyrna lewini*) Bonnethead Shark (*Sphyrna tiburo*) Blacktip Shark (*Carcharhinus limbatus*) Bull Shark (*Carcharhinus leucas*) Spinner Shark (*Carcharhinus brevipinna*) Atlantic Sharpnose Shark (*Rhizoprionodon terraenovae)*	 Neonate, Juvenile Adult Neonate, Juvenile Juvenile, Adult Juvenile Neonate	Highly Migratory Species
Shrimp Brown shrimp (*Penaeus aztecus*) White shrimp (*Penaeus setiferus*) Pink shrimp (*Penaeus duararum*) Royal red shrimp (*Pleoticus robustus*)	ALL	Shrimp
Coastal Migratory Pelagics King mackerel (*Scomberomorus cavalla)* Spanish mackerel (*Scomberomorus maculatus*) Cobia (*Rachycentron canadum*) Dolphin (*Coryphaena hippurus*) Little tunny (*Euthynnus alletteratus*) Cero mackerel (*Scomberomorus regalls*) Bluefish (*Pomatomus saltatrix*)	ALL	Coastal Migratory Pelagics
Reef Fish **Balistidae - Triggerfishes** Gray triggerfish (*Balistes capriscus*) **Carangidae - Jacks** Greater amberjack (*Seriola dumerili*) Lesser amberjack (*Seriola fasciata*) Almaco jack (*Seriola rivoliana*) Banded rudderfish (*Seriola zonata*) **Labridae - Wrasses** Hogfish (*Lachnolaimus maximus*) **Lutjanidae - Snappers** Queen snapper (*Etelis oculatus*) Mutton snapper (*Lutjanus analis*) Schoolmaster (*Lutjanus apodus*) Blackfin snapper (*Lutjanus buccanella*) Red snapper (*Lutjanus campechanus*) Cubera snapper (*Lutjanus cyanopterus*) Gray (mangrove) snapper (*Lutjanus griseus*) Dog snapper (*Lutjanus jocu*) Mahogany snapper (*Lutjanus mahogoni*) Lane snapper (*Lutjanus synagris*)	ALL	Reef Fish

Silk snapper (*Lutjanus vivanus*) Yellowtail snapper (*Ocyurus chrysurus*) Wenchman (*Pristipomoides aquilonaris*) Vermilion snapper (*Rhomboplites aurorubens*) **Malacanthidae – Tilefishes** Goldface tilefish (*Caulolatilus chrysops*) Blackline tilefish (*Caulolatilus cyanops*) Anchor tilefish (*Caulolatilus intermedius*) Blueline tilefish (*Caulolatilus microps*) Golden Tilefish (*Lopholatilus chamaeleonticeps*) **Serranidae – Groupers** Dwarf sand perch (*Diplectrum bivittatum*) Sand perch (*Diplectrum formosum*) Rock hind (*Epinephelus adscensionis*) Speckled hind (*Epinephelus drummondhayi*) Yellowedge grouper (*Epinephelus flavolimbatus*) Red hind (*Epinephelus guttatus*) Goliath grouper (*Epinephelus itajara*) Red grouper (*Epinephelus morio*) Misty grouper (*Epinephelus mystacinus*) Warsaw grouper (*Epinephelus nigritus*) Snowy grouper (*Epinephelus niveatus*) Nassau grouper (*Epinephelus striatus*) Marbled grouper (*Epinephelus inermis*) Black grouper (*Mycteroperca bonaci*) Yellowmouth grouper (*Mycteroperca interstitialis*) Gag (*Mycteroperca microlepis*) Scamp (*Mycteroperca phenax*) Yellowfin grouper (*Mycteroperca venenosa*)		

Managed Fish Species:

The seasonal and year-round locations of designated EFH for the managed fisheries (Table 11-25) are available on the NMFS website (http://sero.nmfs.noaa.gov/hcd/efh.htm), and species abundance maps, both inshore and offshore, are available on the National Ocean Service (NOS) website (http://ccma.nos.noaa.gov/products/biogeography/gom-efh/). EFH figures for Highly Migratory Species (HMS) are found in the 2009 amendments to the Consolidated Atlantic Highly Migratory Species Fisheries Management Plan. EFH for each managed fishery within the project's footprint is described below:

- Red Drum FMP: EFH for red drum consists of all Gulf of Mexico estuaries; waters and substrates extending from Vermilion Bay, Louisiana, to the eastern edge of Mobile Bay, Alabama, out to depths of 25 fathoms; Crystal River, Florida, to Naples, Florida, between depths of 5 and 10 fathoms; and Cape Sable, Florida, to the boundary between the areas covered by the GMFMC and the South Atlantic Fishery Management Council (SAFMC) between depths of 5 and 10 fathoms.

- Reef Fish and Coastal Migratory Pelagics FMPs: EFH for reef fish and coastal migratory pelagics includes all Gulf of Mexico estuaries; the US/Mexico border to the boundary between the areas covered by the GMFMC and the SAFMC from estuarine waters out to depths of 100 fathoms.
- Highly Migratory Species: HMS may be found in large expanses of the world's oceans, straddling jurisdictional boundaries. Although many of the species frequent other oceans of the world, the Magnuson Stevens Act only authorizes the description and identification of EFH in federal, state, or territorial waters, including areas of the U.S. Caribbean, the Gulf of Mexico and the Atlantic coast of the United States, to the seaward limit of the U.S. Exclusive Economic Zone (waters 3 to 200 miles offshore). These areas are connected by currents and water patterns that influence the occurrence of 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 proposed project site is described below (EFH information from NMFS 2009):

  Scalloped Hammerhead Shark:
  - Neonate/YOY (≤60 cm TL): Coastal areas in the Gulf of Mexico from Texas to the southern west coast of Florida; Atlantic coast from the mid-east coast of Florida to southern North Carolina.
  - Juveniles (61 to 179 cm TL): Coastal areas in the Gulf of Mexico from the southern to mid-coast of Texas, eastern Louisiana to the southern west coast of Florida, and the Florida Keys; offshore from the mid-coast of Texas to eastern Louisiana; Atlantic coast of Florida through New Jersey.
  - Adults (≥180 cm TL): Coastal areas in the Gulf of Mexico along the southern Texas coast and eastern Louisiana through the Florida Keys; offshore from southern Texas to eastern Louisiana; Atlantic coast of Florida to Long Island, New York.

  Bonnethead Shark:
  - Neonate/YOY (≤55 cm TL): Coastal areas in the Gulf of Mexico along Texas, and from eastern Mississippi through the Florida Keys; Atlantic coast from the midcoast of Florida to South Carolina.
  - Juveniles (56 to 81 cm TL): Coastal areas in the Gulf of Mexico along Texas, and from eastern Mississippi through the Florida Keys; Atlantic coast from the mid-coast of Florida to South Carolina.
  - Adults (≥82 cm TL): Coastal areas in the Gulf of Mexico along Texas, and from eastern Mississippi through the Florida Keys; Atlantic east coast from the mid-coast of Florida to Cape Lookout, North Carolina.

  Blacktip Shark:
  - Neonate/YOY (≤75 cm TL): Coastal areas in the Gulf of Mexico from Texas through the Florida Keys; Atlantic coastal areas from northern Florida through Georgia and the mid-coast of South Carolina.
  - Juvenile (76 to 136 cm TL): Coastal areas in the Gulf of Mexico from Texas through the Florida Keys; Atlantic coastal areas localized off of the southeast Florida coast and from West Palm Beach, Florida to Cape Hatteras, North Carolina.
  - Adult (≥137 cm TL): Coastal areas in the Gulf of Mexico from Texas through the Florida Keys. In Atlantic coastal areas southeast Florida to Cape Hatteras.

  Bull Shark:

- Neonate/YOY (≤95 cm TL): Gulf of Mexico coastal areas along Texas, and localized areas off of Mississippi, the Florida Panhandle, and west coast of Florida; as well as the Atlantic mid-east coast of Florida.
- Juveniles (96 to 219 cm TL): Gulf of Mexico coastal areas along the Texas coast, eastern Louisiana to the Florida Panhandle, and the west coast of Florida through the Florida Keys; Atlantic coastal areas localized from the mid-east coast of Florida to South Carolina.
- Adults (≥220 cm TL): Gulf of Mexico along the southern and mid-coast of Texas to western Louisiana, eastern Louisiana to the Florida Keys; Atlantic coast from Florida to South Carolina.

Spinner Shark:

- Neonate/YOY (≤70 cm TL): Localized coastal areas in the Gulf of Mexico along Texas, eastern Louisiana, the Florida Panhandle, Florida west coast, and the Florida Keys; Atlantic coast of Florida to southern North Carolina.
- Juveniles (71 to 179 cm TL): Gulf of Mexico coastal areas from Texas to the Florida Panhandle and the mid-west coast of Florida to the Florida Keys; Atlantic coast of Florida through North Carolina.
- Adults (≥180 cm TL): Localized areas in the Gulf of Mexico off of southern Texas, Louisiana through the Florida Panhandle, and from the mid-coast of Florida through the Florida Keys; Atlantic coast throughout Florida and localized areas from South Carolina to Virginia.

Atlantic Sharpnose Shark:

- Neonate/YOY (≤60 cm TL): Gulf of Mexico coastal areas from Texas through the Florida Keys; Atlantic from the mid-coast of Florida to Cape Hatteras, North Carolina.
- Juveniles (61 to 71 cm TL): Gulf of Mexico coastal areas from Texas through the Florida Keys; Atlantic from the mid-coast of Florida to Cape Hatteras, North Carolina, and a localized area off of Delaware.
- Adults (≥72 cm TL): Gulf of Mexico from Texas through the Florida Keys out to a depth of 200 meters; Atlantic from the mid-coast of Florida to Maryland.

- Shrimp FMP: EFH for shrimp consists of Gulf of Mexico waters and substrates extending from the US/Mexico border to Fort Walton Beach, Florida, from estuarine waters out to depths of 100 fathoms; Grand Isle, Louisiana, to Pensacola Bay, Florida, between depths of 100 and 325 fathoms; Pensacola Bay, Florida, to the boundary between the areas covered by the GMFMC and the SAFMC out to depths of 35 fathoms, with the exception of waters extending from Crystal River, Florida, to Naples, Florida, between depths of 10 and 25 fathoms and in Florida Bay between depths of 5 and 10 fathoms.
- Coastal Migratory Pelagics FMPs: EFH for coastal migratory pelagics consists of Gulf of Mexico waters and substrates extending from the US/Mexico border to the boundary between the areas covered by the GMFMC and the SAFMC from estuarine waters out to depths of 100 fathoms. Managed fish in this fishery include king mackerel, Spanish mackerel, and cobia. Non-managed fish in this fishery include cero mackerel, little tunny, dolphin, and bluefish.
- Reef Fish FMP: Reef Fish FMP – EFH for reef fish consists of Gulf of Mexico waters and substrates extending from the US/Mexico border to the boundary between the areas covered by the GMFMC and the SAFMC from estuarine waters out to depths of 100 fathoms.

11.9.6.2.2 Protected Species:

While the areas surrounding the proposed project site, including Lower Mobile Bay and Mississippi Sound, harbor a number of federally-listed threatened, endangered, or candidate species, not all of these species occur in the nearshore habitat of the proposed project. For the species that do occur in the proposed project area (see Table 11-26), their occurrence is considered to be transient in nature. No designated critical habitat occurs within the proposed project area.

Sea Turtles

There are five species of sea turtles that are found within the Gulf of Mexico: green sea turtle, hawksbill sea turtle, loggerhead sea turtle, Kemp's Ridley sea turtle, and leatherback sea turtle. All five species of sea turtles found in the Gulf of Mexico are listed under the ESA. The Gulf populations of green (breeding populations in Florida), hawksbill, Kemp's Ridley, and leatherback sea turtles are listed as endangered. Loggerhead (northwest Atlantic distinct population segment) and green (except the Florida breeding population) sea turtles are listed as threatened. A Biological Evaluation of each of these species was prepared as part of consultation with the USFWS and NMFS.

Gulf Sturgeon

The NMFS and FWS listed the Gulf sturgeon (*Acipenser oxyrinchus)* as a threatened species on September 30, 1991. The Gulf sturgeon, also known as the Gulf of Mexico sturgeon, is a subspecies of the Atlantic sturgeon. Adults are 180 to 240 cm (71-95 inches) in length, with adult females larger than adult males. Adult fish are bottom feeders, eating primarily invertebrates, including brachiopods, insect larvae, mollusks, worms and crustaceans. The Gulf sturgeon is an anadromous fish that migrates from salt water into coastal rivers during the warmer months to spawn. The sturgeon often stays in the Gulf of Mexico and its estuaries and bays in cooler months (NMFS 2013a). Most adult feeding takes place in the Gulf of Mexico and its estuaries. The fish return to breed in the river system in which they hatched. Spawning occurs in areas of deeper water with clean (rock and rubble) bottoms. The eggs are sticky and adhere in clumps to snags, outcroppings, or other clean surfaces. Sexual maturity is reached between the ages of 8 and 12 years for females and 7 and 10 years for males.

Marine Mammals

There are 21 species of marine mammals in the Gulf of Mexico, including dolphins, whales, and the West Indian manatee, all of which are protected under the Marine Mammal Protection Act. The species most likely to occur near the proposed project area are the bottlenose dolphin (*Tursiops truncates*), Atlantic spotted dolphin (*Stenella frontalis*), and the West Indian manatee (*Trichechus manatus*). The bottlenose dolphin (*Tursiops truncates*) 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 the Atlantic spotted dolphin spends the majority of its life offshore, bottlenose dolphin often travel into coastal bays and inlets for feeding and reproduction. Manatees are large herbivores which will consume any aquatic vegetation available to them including sometimes grazing on terrestrial shoreline vegetation. Manatees spend winter months in Florida and make seasonal migrations along the Gulf coast during summer months. Manatees have been spotted as far west as Louisiana and make frequent stops along the Alabama coast. Manatees inhabit freshwater, estuarine,

and marine habitats and are commonly reported Mobile Bay and its tributaries, and in the Mobile-Tensaw River delta.

Table 11-26. Federal and State listed, threatened, and endangered species that potentially occur in the Alabama Oyster Cultch Restoration Area.

COMMON NAME	SCIENTIFIC NAME	FEDERAL STATUS	STATE STATUS	COUNTY	HABITAT
West Indian Manatee	*Trichechus manatus*	E	SP	Mobile	Freshwater, brackish and marine habitats; often near submerged, emergent, and floating vegetation; primarily present during summer months
Green Sea Turtle	*Chelonia mydas*	E, T13	SP	Mobile	Near shore, pelagic marine areas; bays and tidal flats of estuarine areas; beaches of terrestrial areas.
Hawksbill Sea Turtle	*Eretmochelys imbricate*	E	N/A	*N/A	Near shore, pelagic marine areas; bay, lagoon, river mouths and tidal estuarine areas; beaches of terrestrial areas.
Kemp's Ridley Sea Turtle	*Lepidochelys kempii*	E	SP	Mobile	Near shore, pelagic marine areas; bays and tidal flats of estuarine areas; beaches of terrestrial areas.
Leatherback Sea Turtle	*Dermochelys coriacea*	E	SP	Mobile	Marine; open ocean, often near edge of continental shelf; seas, gulfs, bays, and estuaries. Primarily pelagic approaching land for nesting.
Loggerhead Sea Turtle	*Caretta caretta*	E, T	SP	Mobile	Near shore, pelagic marine areas; bay, lagoon, river mouths and tidal estuarine areas; beaches of terrestrial areas.
Gulf Sturgeon	*Acipenser oxyrhynchus desotoi*	T	SP	Mobile	Migrates from large coastal river spawning areas to coastal bays and estuaries.

T = Listed Threatened, E = Listed Endangered, SP = State Protected
Note: *While the National Marine Fisheries Service (NMFS) lists the Hawksbill Sea Turtle as a species that could potentially occur in the proposed project area, the Alabama Natural Heritage Program (ANHP) and NatureServe do not list this species as occurring in the state of Alabama.
Source: NMFS 2013a, ANHP 2012, and NatureServe 2012

Migratory Bird Treaty Act

The Migratory Bird Treaty Act (16 U.S.C. §§703 et seq.) makes it "unlawful at any time, by any means or in any manner, to…take, capture, kill, attempt to take, capture, or kill, possess,…ship, …, transport or cause to be transport …any migratory bird, any part, nest, or egg of any such bird." The MBTA applies to migratory bird species that occur in the United States as the result of natural biological or ecological processes. Over 800 species of birds occurring in the United States are protected under the MBTA. No colonies of colonial nesting waterbirds have been observed in the proposed project area.

Waterfowl

Waterfowl include swans, geese, and ducks that migrate from summer nesting areas in the northern U.S. and Canada along well-described routes or "flyways" to wintering grounds along the Gulf Coast. In addition to waterfowl, other water-dependent birds of the Gulf region include loons, grebes, northern gannet, pelicans and frigate birds, cormorants and an ally, the anhinga, gulls, terns, and various seabirds. Use of the Central and Mississippi Flyways is well documented for waterfowl that use the flyway routes to migrate to breeding areas in the northern and central areas of the U.S. and Canada and return each fall to wintering habitat along the Gulf of Mexico. Large concentrations of wintering common loons stage in the northern Gulf of Mexico prior to northward migration in the spring.

As a result, the Gulf of Mexico is one of the most important wintering and migratory areas for ducks and geese. The coastal marshes of Louisiana, Mississippi, and Alabama provide winter habitat for more than half of the wintering duck population using the Mississippi Flyway while the coastal wetlands of Texas provide wintering habitat for more than half of the Central Flyway waterfowl population (Esslinger and Wilson 2001). As a result, the Gulf Coast provides wintering habitat for large continental populations of several waterfowl species including: 95 percent of gadwall, 80 percent of green-winged teal, 80 percent of redhead, 60 percent of lesser scaup, and 25 percent of northern pintail (Esslinger and Wilson 2001). In addition, the Gulf Coast provides year-round habitat for 90 percent of the mottled duck population in North American and is a key breeding area for whistling-ducks (Esslinger and Wilson 2001). The North American Waterfowl Plan regional partnership known as the GCJV has established six geographically based area initiatives: the Laguna Madre (Texas) Initiative, the Texas Mid-Coast Initiative, the Chenier Plain Initiative, the Mississippi River Coastal Wetlands Initiative (southeast Louisiana), the Coastal Mississippi Wetlands Initiative, and the Mobile Bay (Alabama) Initiative to protect and restore waterfowl populations and habitat (Esslinger and Wilson 2001).

Pelagic seabird species

Pelagic seabird species live most of their lives in open marine waters roosting and feeding at the water surface the entire year; in the breeding season, mature adults return briefly to nesting areas along coastlines. Nesting of pelagic species in the Gulf of Mexico region is very limited and includes only a few locations containing tern colonies. Species regularly observed within the Gulf of Mexico include tropicbirds, boobies, gannets, shearwaters, storm-petrels, jaegers, and phalaropes (Peake and Elwonger 1996). Gull and tern species are also considered pelagic species; however, as colonial nesting species they are discussed with colonial water birds below.

The presence of seabirds is often related to offshore surface eddies and the freshwater plume of the Mississippi River in the northern Gulf of Mexico (Davis et al. 2000). Water depth may also influence the presence of birds, and some bird species may selectively feed on prey items that are themselves attracted to varying depths (Peake and Elwonger 1996). Fronts (the edges of water masses having different characteristics) also attract pelagic birds, especially where lines of Sargassum tend to form (Peake and Elwonger 1996). Seabirds use a variety of foraging techniques and feed on a large spectrum of prey items at various depths of the Gulf. Plunge divers such as tropicbirds, boobies and northern gannets feed on fish and are generally found offshore in warm water. Shearwaters feed at the water's surface and may make shallow dives while the smaller storm-petrels and phalaropes forage by picking

food items from the surface. Jaegers and magnificent frigatebird are kleptoparasitic species that steal food from other birds (Sibley 2001).

Raptors

Raptors that occur along the Gulf Coast include vultures, osprey, kites, hawks, harriers, caracaras, eagles, and falcons. Raptors may be found as year-round resident species, migrants, and wintering species. Year-round resident species include turkey vulture, black vulture, white-tailed kite, red-shouldered hawk, red-tailed hawk, and American kestrel. In addition to these resident raptor species, the crested caracara and white-tailed hawk are resident raptor species with restricted North American ranges and are considered unique to the Gulf Coast region. Osprey, northern harrier, sharp-shinned hawk, Cooper's hawk, merlin, and peregrine falcon winter along the Gulf Coast, though some species such as the osprey may also be present as residents in parts of the Gulf Coast (Brinkley 2008). As a group, raptors prey on other birds, mammals, reptiles, amphibians, fish, carrion, and many invertebrates. Some species feed on a variety of prey items (red-tailed hawk) while other species, such as Cooper's hawk, have a narrow range of prey (Sibley 2001). Vultures and crested caracara are primarily scavengers.

Colonial Waterbirds

Colonial waterbirds are birds that nest in social nesting groups (colonies) often containing a mix of species of a similar group, e.g., a wading bird colony may include multiple species of herons and egrets. This guild consists of two principal groups: wading birds (e.g., herons, egrets, ibises) and ground- or beach-nesting species. Ground-nesting species can be further divided into species that feed in pelagic (open water) habitats such as cormorants, gulls, and terns. In addition, brown pelicans may occasionally nest on the ground (FWS 2002).

Colonial waterbirds feed mostly on aquatic organisms, and as a result, nesting colonies are usually concentrated within appropriate coastal habitats. The location and size of nesting colonies depend directly on the presence of suitable nesting habitat and adequate food availability (Duke and Kruczynski 1992). A substantial percentage of the U.S. population of several species nest within the nearshore environment of the Gulf of Mexico: laughing gull; Forster's, gull-billed, sandwich, least, royal, and Caspian terns; and black skimmer. Florida, Louisiana, and Texas are the primary states in the southern and southeastern U.S. for nesting colony sites and total number of nesting coastal and marine birds (U.S. DOI 2006).

Wading Birds

Wading birds consist of birds with long legs, long necks, and long bills that facilitate foraging in shallow water, probing or actively capturing fish, frogs, aquatic insects, crustaceans, and other prey (Terres 1991). Wading bird families found along the Gulf Coast include herons and egrets (family Ardeidae), storks (Ciconiidae), ibises and spoonbills (family Threskiornithidae), and cranes (family Gruidae). Typical wading bird species include great blue heron, great egret, snowy egret, little blue heron, and tricolored heron. Reddish egret and roseate spoonbill are two species within the U.S. restricted in range to the Gulf Coast region. Wading bird colonies are also referred to as "rookeries" or "heronries".

Shorebirds

Shorebirds are generally restricted to coastline and inland water margins (beaches, mudflats, etc.). As a group, shorebirds are highly migratory and many of these species stop to rest and forage during migration flights or spend the winter in nearshore habitat along the Gulf Coast. The Gulf Coast contains some of the most important shorebird habitat in North America. For migrating and wintering shorebirds the wetlands and barrier islands of this region represent the first large expanses of suitable habitat between northern breeding grounds and more distant wintering grounds in South America (Withers 2002). According to the U.S. Shorebird Conservation Plan (Gulf Coastal Prairie Working Group 2000) for the Lower Mississippi/Western Gulf Coast Shorebird Planning Region, the Gulf Coast provides breeding, wintering, and migratory habitat for 39 species of shorebirds, and the Gulf Coast is considered to be of extremely high importance to 14 species and of considerable importance to 21 species. Numerous species winter along the northern Gulf Coast including17 species of the large Scolopacidae family of shorebirds (e.g., greater and lesser yellowlegs, short- and long-billed dowitchers, red knot and marbled godwit); and several species of plovers, including piping plover, a Federally listed endangered species (Withers 2002).

Marsh Birds

"Marsh bird" is a general term for birds that live in or around marshes and swamps. Passerine species associated with marshes include red-winged blackbird and boat-tailed and great-tailed grackle; however, other marsh species are more secretive. Gulf Coast marshes and freshwater wetlands provide habitat for secretive marsh birds, which are cryptically colored with secretive behaviors and specially adapted to life in the treeless, dense marsh vegetation (FWS 2006). Along the Gulf Coast, bird species found in salt and freshwater marshes include grebes, bitterns, rails, gallinules, limpkin, and passerines exemplified by marsh wren, sedge wren, and the seaside sparrow species complex. Other marsh bird species with more northern breeding ranges winter in Gulf Coast marshes such as yellow rail, sora, Virginia rail, and Nelson's sparrow.

Passerines

Passerines (e.g., flycatchers, vireos, crows, swallows, chickadees, nuthatches, wrens, thrushes, warblers, sparrows, tanagers, grosbeaks, blackbirds, and finches) and near passerines (e.g., pigeons, doves, cuckoos, owls, nightjars, swifts, hummingbirds, kingfishers, and woodpeckers) encompass the majority of land bird species. Many species are neotropical migrants that use a variety of nesting habitats in North America and winter in the Caribbean, and Central and South America. As with shorebirds, the northern Gulf Coast is an important stopover for migrating passerines and near passerines providing resting and foraging habitat.

In addition, some land bird species may overwinter along the Gulf Coast and many species are also year-round residents. Year-round resident species that breed locally in coastal areas along the Gulf include some unique species, such as plain chachalaca, common pauraque, buff-bellied hummingbird, ringed and green kingfishers, golden-fronted woodpecker, Couch's kingbird, great kiskadee, green jay, and hooded and Altamira orioles. Most of these species have their origination in Mexico and have expanded their range northward into Texas where they are primarily found in the Lower Rio Grande Valley and extreme South Texas coast. This area is dominated by the Rio Grande floodplain, and much of the region

has been developed as agriculture, though protected areas of tamaulipan scrub vegetation community provide habitat for the endemic species listed above (Wauer and Elwonger 1998).

Bald and Golden Eagle Protection Act

Bald eagle (*Haliateetus leucocephalus*) was delisted by the FWS. The bald eagle is, however, protected by the U.S. government under the Bald and Golden Eagle Protection Act and the Migratory Bird Treaty Act. Bald eagles occur most commonly in areas close to coastal areas, bays, rivers, lakes, or other bodies of water that provide concentrations of food sources, including fish, waterfowl, and wading birds. Usually the bald eagle nests in tall trees (mostly live pines) that provide clear views of surrounding area. In the Southeast, bald eagles typically nest between September and May. There are no documented occurrences of bald eagles near the project site.

Environmental Consequences

Disturbances to the water column and to benthic organisms would occur as a result of the proposed project's placement of the cultch material during project implementation. Impacts would include a short-term increase in turbidity that would result in minimal adverse impacts on local epifaunal (animals that live on other animals) organisms because the cultch material would rapidly settle out of the water column. Impacts during implementation to these organisms would be adverse but short-term and minor because they would be small, localized and not measurably alter natural conditions. Once implemented the restored reef would provide additional substrate where epifaunal organisms could settle, resulting in long-term, beneficial impacts.

Essential Fish Habitat:

Red Drum

Red drum habitat could be impacted initially and temporarily by construction activities in the short-term when oyster cultch materials are initially deposited in the benthic zone. These activities would likely result in adverse but short term and minor impacts on benthic invertebrate populations and small icthyofauna, and temporary displacement of adult fish. However, these potential impacts would be short term and negligible. These impacts would be small, localized, and not measurably alter natural conditions. Over the longer term, the creation of additional oyster reef habitat would result in increased foraging habitat for red drum and should provide, long term beneficial impacts.

Highly Migratory Species

Estuarine waters like those found at the proposed project site provide EFH resources for various life stages of HMS. Sharks enter the shallow estuarine bay waters to forage and feed (Bathea et al. 2007).

<u>Shrimp</u>

Brown Shrimp

Postlarval, early juvenile, and late juvenile brown shrimp use estuarine habitat for survival. Brown shrimp are common in oyster reef habitats. Potential impacts to habitat for this species

include migratory disruption and benthic habitat alteration. Mud bottom habitat will likely be modified during construction activities in addition to mixing of sediment in the water column. Brown shrimp emigrate to estuaries as post-larvae from February-April on high tides at night and typically leave as sub-adults during full and new moons at night during different parts of the year. Construction activities will take precaution to avoid peak migration periods and time of day. Restoration will benefit these species from short to long term. Oyster cultch deployment will produce additional habitat that the species can utilize for cover and feeding.

White Shrimp

Postlarval white shrimp arrive in the area of the proposed Alabama Oyster Restoration site from May-September. White shrimp in the vicinity of the proposed project will potentially be affected in the same way as brown shrimp, and similar precautions will be taken to minimize impacts during peak migration periods. Like brown shrimp, white shrimp will benefit from restoration due to the creation of additional oyster reef habitat, which they utilize for foraging and refuge.

Pink Shrimp

The absence of SAV at the proposed project site will minimize impacts on pink shrimp relative to brown and white shrimp, but similar precautions will be taken during project implementation to ensure minimal impacts.

Royal Red Shrimp

Royal red shrimp is a deep water species that is abundant east of the Mississippi River on the continental shelf in water depths ranging from 800 to 1,600 feet. These shrimp are only found within the EEZ and are managed cooperatively between state and federal partners (GMFMC 2005). Because royal red shrimp are not present in estuarine habitats during any life stages, this species will not be affected by the work proposed at the Alabama Oyster Reef Restoration site.

Coastal Migratory Pelagics FMP

The managed coastal migratory pelagics which may potentially be present at the proposed project site are Spanish mackerel, king mackerel, and cobia. The king and Spanish mackerel are jointly managed between the GMFMC and the SAFMC. The proposed project site is in the western zone of the king mackerel range, which extends from Texas to the Alabama/Florida border. The western zone group of king mackerel winter in the waters of southern Texas and Mexico, and migrate north to their spawning grounds in the summer (NMFS 2013). Like king mackerel, Spanish mackerel and cobia migrate south during the winter months and return north to their spawning grounds in the spring (GMFMC & SAFMC 1983). Mackerel tend to feed exclusively on other reef fishes while cobia feed on both fishes and crustaceans. The estuarine components of the EFH in the Mobile Bay are used for feeding, foraging, and resting during summer months. Habitat use for all life stages is primarily water column, so habitat impacts from restoration activities would involve temporary displacement and short term decreased water quality from sediment mixing. Adults typically only use these shallow areas in the pursuit of prey and typically prefer higher salinity waters (GCFMC 2004). These impacts would be short in duration, transitioning to intermediate and long term benefits to the species due to increased oyster reef habitat, which increases the abundance of prey items.

Non-managed coastal migratory pelagics include cero mackerel, dolphin, little tunny, and bluefish. Adult dolphin have been reported in Mobile Bay throughout the year (NOS 1998), and based on correlations between water temperature larval presence, spawning in the Northern Gulf of Mexico likely occurs from April through December, with a peak in early fall (Ditty et. al. 2004). Little tunny is a schooling species that occurs in tropical and subtropical waters. They are common offshore, but can be found in inshore waters over reefs. Little tunny larvae are often found in nearshore and offshore waters near shoals and banks (GMFMC 2004). Cero mackerel primarily occur in the Caribbean, although some are caught in South Florida (Collette and Russo 1979). Bluefish occur in the Gulf of Mexico primarily from northwestern Florida to northeastern Texas (Heinemann 2002). Larvae have been collected in the Gulf of Mexico in waters less than 100 meters deep (Ditty and Shaw 1995).

Reef Fish

The reef fish fishery includes numerous species that are present in the estuarine zone during one or more life stages. Most are transitory species that use inshore environments only part of the year. Only mutton and gray snapper use the estuarine zone as adults for feeding. All reef species listed in Table A1-1 have the potential to use this zone as early or late juveniles for growth and feeding habitat. Impact of the project to habitat for reef fishes would be low, as most reef species do not utilize the habitat in the project area. Reef fish abundance is much higher in the southern and eastern Gulf of Mexico, where grouper and snapper species are more common. Juveniles of these species typically use SAV beds in estuarine environments for food and cover (GCFMC 2004). Given the lack of SAV beds in the study area, it is unlikely that there is an abundance of juvenile reef species in the area. Project construction could result in short-term displacement of feeding adults, and possible mortality to larval fish that did not successfully evade construction activities. The proposed oyster cultch deployment could benefit gray and lane snapper as they prefer shell/sand bottom.

Summary Impacts to EFH

During project implementation, the restoration of approximately 319 acres of historic oyster reef in the estuarine waters of Alabama through the selective placement of cultch material could result in temporary increases in local turbidity and suspended sediment concentrations in the water column. These adverse effects would be minor, localized, and short term as particles would settle out within a few hours of placement and any impacts would quickly be undetectable. Because the proposed project site itself is located in open water, with minimal staging areas on already developed land areas, there would be no impacts to wetlands, floodplains or groundwater. Indirect adverse impacts are not expected in the short or longer term.

Protected Species

Sea Turtles

Effects on sea turtles include the risk of injury from construction activities, including physical impacts from construction materials or operating construction machinery. Due to these species' mobility and the implementation of NMFS' Sea Turtle and Smalltooth Sawfish Construction Conditions, the risk of injury

from construction would be minimal. Sea turtles may be affected by being temporarily unable to use the project site due to potential avoidance of construction activities and related noise, but these effects would not be significant.

Gulf Sturgeon

Potential adverse effects on Gulf sturgeon would include the risk of injury from construction activities, which would not be significant due to the species' mobility and their low likelihood of occurrence close to the project site. Some bottom habitat would be converted to hard bottom, as already described.

Spring sturgeon migration occurs between February and May, although most sturgeon have begun to ascend the rivers by April. Fall migration occurs between November and December when waters reach 23°C. Cultch material would be deployed during peak oyster larval production between April and May and between October and September. While a short temporal overlap may exist between the timing of sturgeon migration and proposed oyster restoration activities conducted by ADCNR, there is no overlap between critical habitat used for migration and the oyster restoration activities associated with the proposed project.

West Indian manatee

Potential adverse effects to the West Indian manatee could include the risk of injury from boats and other equipment during cultch placement. Such encounters would be unlikely since the West Indian manatee is a mobile species and would likely avoid the project area during construction activities. Additionally, cultch placement would likely occur between April and May, prior to the migratory season when manatees are typically present in Alabama. Risk of adverse effects to manatees and other marine mammals would be further minimized by following FWS "Standard Manatee Conditions for In-Water Work" during all project implementation and monitoring activities.

No overlap exists between activities associated with the proposed project and the critical habitat for any other threatened, endangered, proposed, or candidate species that potentially occur in the area.

Oysters and Benthic Invertebrates

Potential adverse effects to benthic organisms, oysters, and fish may occur during construction activities; however these effects would be short term and localized. Disturbance of individual species would occur; however, there would be no change in the diversity or local populations of marine and estuarine species. Any disturbance would not interfere with key behaviors such feeding and spawning. There would be no restriction of movements daily or seasonally.

Birds

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 is generally incorporated into Section 404 of the CWA, NEPA, or other federal permit, license or review requirements.

The project would have a minor, short term impact to birds during construction due to elevated noise levels and presence and operation of equipment. Given the small project footprint and the species' mobility, any species foraging within the project area during construction would be able to avoid direct impacts. Potential effects to prey resources may occur during construction; however, these would be minor and temporary

The proposed action would result in minor, short-term, localized adverse impacts to transient bird individuals during construction, but these species are mobile and would likely exit the area during construction (no impacts to overall population). If nesting birds are located and conservation measures are established for bird species, the proposed action would not result in adverse impact to nesting birds. The proposed action would have a long-term minor beneficial impact due to increasing habitat for juvenile finfish and shellfish as a source of food for shorebirds and wading birds. The proposed action would not result in indirect impacts to birds.

Summary Impacts to Protected Species

At this time, Alabama has made contact with NMFS and USFWS to start coordination and reviews under EFH and ESA Section 7. Any species-specific measures required by NMFS or USFWS will be incorporated into the project construction process to avoid and minimize species impacts to the maximum extent practicable. Additional detail is provided in Chapter 7: Introduction to Proposed Phase III Early Restoration Projects (7.5 Environmental Compliance).

In summary, the proposed project would result in adverse but short-term, minor, and localized impacts to biological resources as a result of increased turbidity within the water column and the settling of sediments during construction activities. All biological impacts from project implementation would be temporary and would cease shortly after construction is finished. These impacts would be detectable, but localized and not measurably alter natural conditions; therefore they can be characterized as short-term and minor. Any impacts would be minimized by using BMPs such as conducting construction activities outside of critical migration and life cycle stages.

11.9.6.3 Human Uses and Socioeconomics

11.9.6.3.1 Socioeconomics and Environmental Justice

Affected Resources

This section provides an overview of socioeconomic characteristics for municipalities located near the proposed project. Because the proposed project would be sited in estuarine waters in Mobile County, those municipalities that would likely experience the greatest effects from the construction and operation were selected. Other smaller municipalities are located near to the proposed project; however, economic data are not available because of their small size and disclosure issues. Information presented below has been retrieved from the 2010 decennial Census or 2007-2011 American Community Survey (ACS), both products of the U.S. Census Bureau. Racial and ethnic characteristics are available from the 2010 decennial Census. Economic indicators are presented in 5-year estimates from the ACS. This information is no longer being reported in the decennial Census.

Racial and Ethnic Characteristics. Bayou La Batre is the most racially and ethnically diverse of the study area municipalities (see Table 11-27). It has the largest concentration of those who identify themselves as Asian. Mobile County has the largest concentration of those who identify themselves as Black or African American. Approximately 60 percent of Bayou La Batre residents and more than 79.7 percent of Grand Bay, Theodore, and Tillman's Corner residents identify themselves as White.

All study area municipalities demonstrate relatively low concentrations of those who identify themselves as Hispanic or Latino origin. Grand Bay, Theodore, and Tillman's Corner have significantly smaller concentrations of those who identify themselves as being of a minority than either Bayou La Batre or Mobile County (U.S. Census Bureau, 2013a).

Executive Order 12898, "Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations" defines a minority as any person who identifies themselves as being of a race other than Non-Hispanic White alone. The minority population is defined as either the minority population of the affected area exceeding 50 percent or the minority population percentage of the affected area being meaningfully greater than the minority population percentage in the general population or other appropriate unit of geographic analysis (Council on Environmental Quality, 1997). As illustrated in Table 11-28, the minority population in Bayou La Batre is significantly greater than in other municipalities presented in this analysis; however, it is slightly less than Mobile County overall. Other study area municipalities have minority concentrations that are well below the Mobile County average.

Table 11-27. Racial and ethnic composition of study area geographies, 2010.

RACE/ETHNICITY	GEOGRAPHIC AREA				
	BAYOU LA BATRE, AL	GRAND BAY, AL	THEODORE, AL	TILLMANS CORNER, AL	MOBILE COUNTY, AL
White alone	60.3%	86.9%	79.7%	82.2%	60.2%
Non-Hispanic White alone	*98.8%*	*98.5%*	*97.6%*	*97.8%*	*98.1%*
Hispanic White alone	*1.2%*	*1.5%*	*2.4%*	*2.2%*	*1.9%*
Black or African American alone	12.3%	9.4%	13.3%	11.4%	34.6%
American Indian and Alaska Native alone	0.4%	0.6%	1.1%	0.6%	0.9%
Asian alone	22.8%	0.7%	2.4%	2.1%	1.8%
Native Hawaiian and Other Pacific Islander alone	0.1%	0.0%	0.0%	0.1%	0.0%
Other*	4.2%	2.4%	3.4%	3.5%	2.4%
Total	**2,558**	**3,672**	**6,130**	**17,398**	**412,992**
Hispanic or Latino Origin	2.8%	2.3%	3.2%	3.8%	2.4%
Minority**	40.4%	14.4%	22.2%	19.6%	40.9%

Note: *the 'Other' category includes all those who identify themselves as being of 'Some Other Race' or 'Two or More Races'.
**Executive Order 12898, "Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations" defines a minority as any person who identifies themselves as being of a race other than Non-Hispanic White alone.

Source: U.S. Census Bureau 2013a. SF1 data files.

Economic Characteristics. In all study area municipalities included in Table 11-28, manufacturing and educational services and health care and social assistance sectors are two of the three largest employment sectors. Together they represent between 29 percent and 35.8 percent of employment in their respective geographies. Bayou La Batre has a notably higher concentration of jobs in the agriculture, forestry, fishing and hunting, mining, and public administration sectors than other study area municipalities. All other study area municipalities show a notably higher concentration of jobs in the professional, scientific, and management, and administrative and waste management services sector than Bayou La Batre. Grand Bay and Theodore have the highest concentrations of jobs in the construction sector and lower concentrations of retail trade than other study area municipalities. Grand Bay has the lowest unemployment rate of all study area municipalities (see Table 11-29). This rate is notably lower than other areas of comparison; all have unemployment rates that exceed 10 percent. Bayou La Batre and Theodore also have unemployment rates higher than that of Mobile County.

Table 11-28. Employment by industry of study area geographies, 2007-2011.

INDUSTRY	BAYOU LA BATRE, AL	GRAND BAY, AL	THEODORE, AL	TILLMANS CORNER, AL	MOBILE COUNTY, AL
Civilian employed population 16 years and over	940	1,664	2,656	7,046	173,345
Agriculture, forestry, fishing and hunting, and mining	5.5%	0.1%	0.8%	0.2%	1.4%
Construction	8.3%	**16.6%**	**13.5%**	9.8%	8.1%
Manufacturing	**11.7%**	**12.4%**	**13.0%**	**12.7%**	**11.0%**
wholesale trade	5.3%	6.7%	5.8%	3.8%	3.5%
Retail trade	**17.4%**	7.3%	9.0%	**12.7%**	**12.8%**
Transportation, warehousing, and utilities	2.7%	8.4%	2.3%	9.0%	6.1%
Information	0.0%	2.9%	1.4%	1.7%	1.5%
FIRE*	1.6%	1.9%	4.3%	5.3%	5.6%
Professional, scientific, and management, and administrative and waste management services	2.2%	11.0%	8.7%	10.3%	9.7%
Educational services, and health care and social assistance	**23.5%**	**22.5%**	**22.9%**	**16.3%**	**22.5%**
Arts, entertainment, and recreation, and accommodation and food services	9.4%	6.9%	8.5%	8.4%	8.3%
Other services, except public administration	3.4%	1.9%	6.5%	6.6%	5.5%
Public administration	8.9%	1.5%	3.4%	3.2%	4.1%

Note: *FIRE includes the finance, insurance, real estate, and rental and leasing sectors.
**bold indicates the top three industries in each geographic area of comparison.
Source: U.S. Census Bureau 2007-2011 American Community Survey 2013b.

Table 11-29. Employment and unemployment characteristics, 2007-2011.

EMPLOYMENT STATUS	BAYOU LA BATRE ALABAMA	GRAND BAY, ALABAMA	THEODORE, ALABAMA	TILLMANS CORNER, ALABAMA	MOBILE COUNTY, AL
In labor force	1,093	1,758	2,993	7,887	194,388
Civilian labor force	1,093	1,758	2,986	7,834	193,405
Employed	*86.0%*	*94.7%*	*88.9%*	*89.9%*	*89.6%*
Unemployed	*14.0%*	*5.3%*	*11.1%*	*10.1%*	*10.4%*
Armed Forces	0	0	7	53	983
Not in labor force	716	1,536	1,848	4,814	125,024

Source: U.S. Census Bureau 2007-2011 American Community Survey 2013b.

Table 11-32 summarizes earnings and poverty rates in the study area. The median annual household income in Bayou La Batre and Tillman's Corner is less than $40,000—notably less than in either Grand Bay or Theodore. While Theodore reports a higher median household income than most study area geographies, the per capita income is one of the lowest of study area geographies. The highest per capita income is in Grand Bay and Mobile County overall.

11.9.6.3.2 Environmental Justice

The environmental setting of a project area can be viewed from both a geographic perspective and a human perspective. The physical environment provides a geographical context for the populations to be evaluated in this Environmental Impact Statement. The human perspective encompasses race, ethnic origin, and economic status of affected groups.

The intent of an environmental justice evaluation under Executive Order 12898, Federal Actions to Address Environmental Justice in Minority and Low Income Populations (1994), is to identify communities and groups that meet environmental justice criteria, and suggest strategies to reduce potential adverse impacts of projects on affected groups.

The purpose of Executive Order 12898 is to identify and address the disproportionate placement of adverse environmental, economic, social, or health impacts from Federal actions and policies on minority and/or low-income communities. This order requires lead agencies to evaluate impacts on minority or low-income populations during preparation of environmental and socioeconomic analyses of projects or programs that are proposed, funded, or licensed by Federal agencies.

In addition to the direction referenced above, Executive Order 12898 includes the following requirements:

- Each Federal agency shall conduct its programs, policies, and activities that substantially affect human health or the environment, in a manner that ensures that such programs, policies, and activities do not have the effect of excluding persons (including populations) from participation in, denying persons (including populations) the benefits of, or subjecting persons (including populations) to discrimination under such programs, policies, and activities because of their race, color, or national origin.

- Each Federal agency shall work to ensure that public documents, notices, and hearings relating to human health or the environment are concise, understandable, and readily accessible to the public.

In addition, the presidential memorandum accompanying the executive order states that "(e)ach Federal agency shall analyze the environmental effects, including human health, economic and social effects, of Federal actions, including effects on minority communities and low-income communities, when such analysis is required by the NEPA of 1969."

Two documents provide some measure of guidance to agencies required to implement Executive Order 12898. The first is Environmental Justice Guidance Under the National Environmental Policy Act (December 1997), published by CEQ. The second document, the Final Guidance for Incorporating

Environmental Justice Concerns (April 1998) published in the U.S. Environmental Protection Agency's NEPA Compliance Analysis, serves as a guide for incorporating environmental justice goals into preparation of the Environmental Impact Statement under NEPA. These documents provide specific guidelines for assessing environmental justice effects associated with a proposed Federal project.

According to CEQ and U.S. Environmental Protection Agency guidelines established to assist Federal and State agencies, a minority population is present in a project area if (1) the minority population of the affected area exceeds 50 percent, or (2) the minority-population percentage of the affected area is meaningfully greater than the minority-population percentage in the general population or other appropriate unit of geographic analysis. By the same rule, a low-income population exists if the project area consists of 50 percent or more people living below the poverty threshold, as defined by the U.S. Census Bureau, or is meaningfully greater than the poverty percentage of the general population or other appropriate unit of geographic analysis.

The CEQ guidance indicates that when agencies determine whether environmental effects are disproportionately high and adverse, they are to consider whether there is or would be an impact on the natural or physical environment (as defined by NEPA) that would adversely affect a minority population or low-income population.

None of the published guidelines define the term "disproportionately high and adverse," but CEQ includes a nonquantitative definition stating that an effect is disproportionate if it appreciably exceeds the risk or rate to the general population (CEQ 1997).

The following population characteristics are considered in this analysis:

- Race and ethnicity
- Per-capita income as it relates to the poverty level

The relevant demographic data were obtained from the U.S. Census Bureau and The State of Alabama. Data are presented at the county level to accommodate the geographic size of each portion of the study area.

In this analysis, a county is considered to have a minority population if its nonwhite population is greater than 50 percent or is meaningfully larger than the general (statewide) nonwhite population. Low-income areas are defined as counties in which the percentage of the population below poverty status exceeds 50 percent, or is meaningfully greater than the general population (average statewide poverty level).

To make a finding that disproportionately high and adverse effects would likely fall on minority or low-income populations, three conditions must be met simultaneously:

- There must be a minority or low-income population in the impact zone.
- A high and adverse impact must exist.
- The impact must be disproportionately high and adverse on the minority or low-income population

As demonstrated in Table 11-30, in 2010, approximately 40.9% of Mobile County population are identified as minority, which is 7.9 percent greater than the proportion in state of Alabama. There is no established definition for the definition of "meaningfully greater"; for purposes of this analysis, if the study area is 10 percentage points greater than the reference area, a population will be identified as having high concentrations of minority residents. Because the minority population in Mobile County is less than 10 percent greater than the proportion of minority residents in the state of Alabama, Mobile County is not defined as having high concentrations of minority residents.

Table 11-30. Racial and Ethnic Composition of Mobile County and the State of Alabama, 2010.

RACE/ETHNICITY	GEOGRAPHIC AREA	
	MOBILE COUNTY, ALABAMA	STATE OF ALABAMA
White alone	60.2%	68.5%
Non-Hispanic White alone	98.1%	97.8%
Hispanic White alone	1.9%	2.2%
Black or African American alone	34.6%	26.2%
American Indian and Alaska Native alone	0.9%	0.6%
Asian alone	1.8%	1.1%
Native Hawaiian and Other Pacific Islander alone	0.0%	0.1%
Other*	2.4%	3.5%
TOTAL	412,992	4,779,736
Hispanic or Latino origin	2.4%	3.9%
Minority**	40.9%	33.0%

Note: *the 'Other' category includes all those who identify themselves as being of 'Some Other Race' or 'Two or More Races'.
**Executive Order 12898, *Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations* defines a minority as any person who identifies themselves as being of a race other than Non-Hispanic White alone.

Source: U.S. Census Bureau, 2013a. SF1 data files.

Approximately 19.2 percent of Mobile County residents report living below the poverty line, approximately 1.6 percent greater than the state of Alabama average. The median household and per capita incomes in Mobile County are similar to that of the state of Alabama overall.

Table 11-31. Poverty Status* and earnings for Mobile County and the State of Alabama, 2007-2011.

INDICATOR	MOBILE COUNTY, ALABAMA			STATE OF ALABAMA		
		BELOW POVERTY LINE		TOTAL	BELOW POVERTY LINE	
	TOTAL	NUMBER	PERCENT	NUMBER	Number	Percent
Population for whom poverty status is determined	402,006	77,088	19.2%	4,631,432	813,385	17.6%
AGE						
Under 18 years	102,345	29,088	28.4%	1,117,857	280,932	25.1%
Related children under 18 years	102,079	28,822	28.2%	1,113,509	276,973	24.9%
18 to 64 years	248,632	41,851	16.8%	2,886,264	462,034	16.0%
65 years and over	51,029	6,149	12.1%	627,311	70,419	11.2%
Median household income	$42,187			$42,934		
Per capita income	$22,306			$23,483		

Note: *poverty status is determined for the 12 months prior to reporting.
Source: U.S. Census Bureau, 2013b. 2007-2011 American Community Survey.

Environmental Consequences

The proposed project has been designed to support ecological restoration efforts across the Gulf Coast region. Indirectly, economic benefits would likely result from the increased availability of oysters for harvesting. This section provides a summary of anticipated economic benefits that would result from the implementation of the proposed ecological restoration project.

A literature review was conducted to determine how oyster restoration efforts in Alabama may affect the local and regional employment base. To date, little information is available in this regard. However, NMFS recently reported on two Recovery Act-funded oyster restoration projects implemented in Alabama since 2009. These projects have directly supported 227 jobs with additional indirect and induced jobs ranging from mechanics to steel manufacturers and local fishermen and mesh shell bag producers (NMFS 2012b).

The proposed project would restore approximately 319 acres of historical oyster reefs that are currently degraded. Implementation of the proposed project would enhance the provision of oyster ecological services, and additionally lead to an increase to the acreage available for oyster harvesting in suitable waters. Activities associated with implementation of the proposed project would result in a short-term, minimal increase in economic activity for businesses preparing, moving, and laying the cultch at the project site. Over the long-term, the proposed project would indirectly result in renewed employment opportunities for area residents, including minority and/or low-income populations, and increased economic activity associated with oyster harvesting and other jobs that are linked to this activity. As a

result, it is anticipated that the proposed project would result in long-term economic benefits in the area.

Table 11-32. Poverty status* and earnings, 2007-2011.

INDICATOR	BAYOU LA BATRE, AL			GRAND BAY, AL			THEODORE, AL			TILLMANS CORNER, AL			MOBILE COUNTY, AL		
		BELOW POVERTY LEVEL			BELOW POVERTY LEVEL			BELOW POVERTY LEVEL			BELOW POVERTY LEVEL			BELOW POVERTY LEVEL	
	TOTAL	NUMBER	PERCENT	TOTAL	NUMBER	PERCENT	TOTAL	NUMBER	PERCENT	TOTAL	NUMBER	PERCENT	TOTAL	NUMBER	PERCENT
Population for whom poverty status is determined	2,580	493	19.1%	4,009	411	10.3%	6,529	1,453	22.3%	16,538	3,179	19.2%	402,006	77,088	19.2%
Age															
Under 18 years	798	171	21.4%	898	121	13.5%	1,948	799	41.0%	4,162	1,035	24.9%	102,345	29,088	28.4%
Related children under 18 years	798	171	21.4%	897	120	13.4%	1,930	781	40.5%	4,162	1,035	24.9%	102,079	28,822	28.2%
18 to 64 years	1,462	235	16.1%	2,530	290	11.5%	3,807	620	16.3%	10,283	1,948	18.9%	248,632	41,851	16.8%
65 years and over	320	87	27.2%	581	0	0.0%	774	34	4.4%	2,093	196	9.4%	51,029	6,149	12.1%
Median Household Income	$39,273			$49,353			$44,747			$39,925			$42,187		
Per Capita Income	$16,932			$22,148			$17,957			$18,844			$22,306		

Note: *poverty status is determined for the 12 months prior to reporting.
Source: U.S. Census Bureau, 2007-2011 American Community Survey 2013b.

Public costs of the proposed project would be limited to monitoring activities conducted by ADCNR (see Operations and Maintenance section above). These activities are also performed for other oyster reefs in the area; therefore additional incremental costs would be minimal.

Because of the nature of the proposed project, minority and/or low-income populations would not experience disproportionately high adverse impacts as a result of its implementation. Additionally, because the proposed project would generate a certain number of jobs, it is anticipated that minority and/or low-income populations would retain a portion of them.

Over both the short- and long-term, the proposed project would result in an increase in economic activity. Implementation of the proposed project would occur within a relatively short time frame and benefits are anticipated to be minor and localized. The proposed project is anticipated to have a lifespan of approximately 10 years after the reef reaches maturity. As a result, it is anticipated that the indirect economic benefits from harvesting would be recognized throughout the proposed project's life cycle. Therefore, the operation of the proposed project would result in long term, beneficial economic impacts.

11.9.6.3.3 Cultural Resources

Affected Resources

For the purposes of compliance with Section 106 of the National Historic Preservation Act of 1966, as amended and its implementing regulations, the Area of Potential Effect is the geographic area or areas within which an undertaking may directly or indirectly cause alterations in the character or use of historic properties, if any such properties exist (36 C.F.R. § 800.16 (d)). The Area of Potential Effect of the proposed project consists of the 319-acre footprint of the oyster cultch placement located in the estuarine waters of Mobile County, Alabama. No properties listed in or eligible for the National Register of Historic Places (NRHP) have been identified within the Area of Potential Effect. Coordination has been completed with the Alabama Historical Commission (AHC). On February 2, 2013, the AHC issued concurrence for this project. Additional conversations with the AHC have indicated that no additional actions are needed. Additionally, given the subtidal nature of the project site, tribal culturally significant areas are not expected to occur within the Area of Potential Effect. In addition, oyster harvesting has occurred in the Area of Potential Effect in the past.

Although no historic properties are present within the Area of Potential Effect, the Civil War battle of Mobile Bay was fought in the estuarine waters of Mobile County. Union and Confederate naval forces were engaged immediately to the east of the Area of Potential Effect. The possibility that unexploded ordnance from the battle is present in the area cannot be fully ruled out, although the likelihood is low given past harvesting of oysters in these areas. No information on the presence of shipwrecks or artifacts of historical importance was included in the State Historic Preservation Officer (SHPO) letter concerning the project dated February 4, 2013.

Environmental Consequences

Consultation with the Alabama SHPO was initiated to determine the presence or absence of historic, archeological, or culturally significant resources either listed on or eligible for inclusion on the NRHP. There are a number of shipwrecks in proximity to the Area of Potential Effect; however, these protected resources are outside the Area of Potential Effect and would not be affected by the proposed project. The Alabama SHPO determined that the proposed project would not affect any cultural resources listed on or eligible for inclusion on the NRHP (AHC 2013). Additionally, it is unlikely that the proposed project would impact resources of historical significance related to the battle of Mobile Bay.

However, if potential cultural resources are identified during implementation of the proposed project, activities would cease and the Alabama SHPO would be contacted to determine the significance of these resources. Because the proposed project would be sited within the historic footprint of oyster reefs and restore historical oyster reefs that are currently degraded, it is not anticipated that resources of significance would be identified during its implementation. Indirect effects, both short and long term, are not anticipated.

A complete review of this project under Section 106 of the NHPA would be completed as environmental review continues. This project would be implemented in accordance with all applicable laws and regulations concerning the protection of cultural and historic resources.

11.9.6.3.4 Infrastructure

Affected Resources

ADNCR, with assistance/funding from the Coastal Impact Assistance Program, Fish and Wildlife Service, U.S. Department of the Interior, has prepared an interactive offshore infrastructure map to identify the approximate area that pipelines, offshore wells, and other infrastructure are present in the waters off the Alabama coast. A three-mile buffer was drawn around the approximate site of the proposed project. This area was selected to ensure that the approximate ½ square mile of the proposed project was captured in the analysis. The analysis concluded that there are no buried pipelines, offshore wells, or other infrastructure present within three miles of the proposed project area (ADNCR 2013).

Traffic generated by the proposed action would include the vehicles necessary to collect and transport cultch material to the launch site, requiring less than five vehicles. Because the proposed project would contribute minimally to traffic on the surrounding roadway network this topic is not carried forward for full analysis below.

Environmental Consequences

Because no ground disturbance is anticipated and the proposed project site is outside areas where offshore infrastructure is present, no adverse impacts or indirect effects to infrastructure would result from the construction and operation of the proposed project.

11.9.6.3.5 Land and Marine Management

Affected Resources

The proposed project area includes existing and historic public oyster reefs located in estuarine waters in the Lower Mobile Bay and Mississippi Sound in Mobile County, Alabama. The proposed project area does not include terrestrial or shorelines areas beyond serving as a staging and launch point for cultch placement operations.

Environmental Consequences

The implementation of the proposed project would not directly or indirectly alter historic land uses, shoreline areas, or wetlands. It would be sited in an area that has historically been used as oyster reefs and would be re-establishing a previous use. Access to existing oyster reefs would not be restricted during project implementation.

The proposed project would be designed and implemented to be consistent with all applicable designations set forth in the Alabama Coastal Area Management Program and other appropriate local zoning requirements.

Because land use would not change and would be consistent with historic and adjacent uses, and because overall land use and management of the area would not be affected, there would be no impacts to land and marine management during implementation of operation of the restored oyster reef.

11.9.6.3.6 Aesthetics and Visual Resources

Affected Resources

Aesthetics and visual resources that may be affected by the proposed project include areas that fall within the view-shed of proposed project activities. This includes the waters of Lower Mobile Bay and the Mississippi Sound. Portions of coastal areas are also visible from this location.

Environmental Consequences

Placement of cultch material in the proposed project area in Lower Mobile Bay would involve using material haul trucks, barges, and other large equipment that would contribute to temporary visual impacts in the view-shed of the proposed project during each of the two plantings, estimated to last 5-days each. Estimated daily usage of vehicles during each construction period would include two skid steers for 4 hours; two excavators for 4 hours; two push boats for 6 to 8 hours; six unpowered barges for 6 to 8 hours; and two to four diesel-powered pumps for six high pressure hoses for 6 to 8 hours. The transport and storage of cultch materials associated with the proposed project would not contribute to impacts to visual resources since these activities are consistent with activities that are already occurring within the area and this project represents a small increase to these activities. The cultch placement process would be localized and short-term and result in minor adverse impacts. There would be a temporary change in the view-shed but this would not dramatically alter views in a way that would detract from other activities in the area.

Following placement of the cultch material, there would be no long-term visual impacts because the deposited cultch material would be under the water surface. While maintenance and monitoring vessels would be used, this would not have any effect because oyster harvest activities are already occurring in

the area and marine traffic is part of the existing visual landscape. No other long-term impacts to visual aesthetics and visual resources from operation of the restored oyster reef would result. Indirect impacts are not anticipated.

11.9.6.3.7 Tourism and Recreational Use

Affected Resources

The ADCNR and the Alabama Department of Public Health (ADPH) regulate open and closed harvest areas for management and public health purposes. In areas open to commercial harvest, individuals are permitted to take up to but no more than 100 oysters per day for personal consumption. A commercial oyster catcher's license is required if more than 100 oysters are harvested and sold for commercial purposes. Oysters can be retrieved from public reefs and water bottoms by hand, oyster tongs, or dredges. The above-mentioned departments have established daily and seasonal protocols and limits that need to be followed when harvesting oysters (Department of Conservation and Natural Resources 2012). In addition to harvesting activities, the area is also used for recreational fishing.

Environmental Consequences

During implementation of the proposed project, public access to the project area would be restricted for approximately 5 days for each of the two planting events. However, there are other areas near the project site where people could harvest oysters or recreate during this time. Users would likely be aware of the changes, but impacts would be local and relatively few uses would be affected; as a result, impacts would be adverse but also short-term and minor.

As this project would be for the purposes of ecological restoration, impacts from operation to tourism and recreational use would be indirect. Because of the limited nature of recreational oyster harvesting within the proposed project area, adverse effects associated with its implementation would be minimal and localized. Over the long term, in addition to the ecological benefits provided, the proposed project would renew opportunities for people to harvest oysters. This indirect impact of the ecological restoration project will be beneficial for the public.

No other effects are anticipated to tourism and recreational use under the proposed action.

11.9.6.4 Public Health and Safety and Shoreline Protection

Affected Resources

The proposed project would be sited in estuarine waters in the Lower Mobile Bay and Mississippi Sound. Oyster harvesters and other users launch boats from coastal areas to access parts of the Bay and Sound as well as outer areas. Boat launch areas are located in various coastal locations. There are no brownfield or voluntary cleanup sites located in municipalities near the proposed project site (Alabama Department of Environmental Management 2011). There are no Superfund sites located within proximity to the proposed project site (U.S. EPA 2013).

Environmental Consequences

Because the proposed project would be located off the Alabama coast, it is not anticipated that impacts on public health and safety or shoreline protection would result during implementation or operation. It is anticipated that people harvesting oysters from the proposed project area would continue to do so in a way that would ensure their and other harvesters' safety. The proposed project would not affect shoreline erosion and would not result in the exposure to hazardous materials. No indirect effects are anticipated.

11.9.7 Summary and Next Steps

Per the Purpose and Need of the Draft Phase III ERP/PEIS, four alternatives are considered, including a no action (Alternative 1), selection of project types emphasizing habitat and living coastal and marine resources (Alternative 2), project types emphasizing recreational opportunities (Alternative 3), or a combination of both habitat and living coastal and marine resources and recreational opportunities (Alternative 4). As proposed, Alabama Oyster Cultch Restoration project implements restoration techniques within Alternatives 2 and 4.

The proposed Alabama Oyster Cultch Restoration project would include placing approximately 30,000 – 40,000 cubic yards of suitable oyster shell cultch over approximately 319 acres of subtidal habitat in Mobile County, Alabama, near other oyster reefs currently managed by the ADCNR. The objective of this project is to enhance oyster biomass through the selective placement of oyster cultch in Alabama's estuarine waters. Cultch placements promote the settlement and growth of oyster spat and have been successful in producing new oysters in Alabama. The project is consistent with Alternative 2 (Contribute to Restoring Habitats and Living Coastal and Marine Resources) and Alternative 4 (Preferred Alternative).

Draft NEPA analysis of the environmental consequences suggests that while minor adverse impacts to some resource categories may occur, no moderate to major adverse impacts are anticipated to result. The project would provide long-term benefits by creating new habitat for oysters and other species, which would in turn provide multiple ecosystem benefits.

The Trustees have started coordination and reviews under the Endangered Species Act, the Magnuson-Stevens Fishery Conservation and Management Act, the Historic Preservation Act, the Marine Mammal Protection Act, the Bald and Golden Eagle Protection Act, Coastal Zone Management 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. Final determination on this project will be included in the final Phase III ERP/PEIS and Record of Decision.

11.9.8 References

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11.10 Cumulative Impacts

This section analyzes the potential for cumulative impacts to resources to occur as a result of the Phase III Early Restoration projects proposed in Alabama. The projects are physically separate from each other and are distributed across the state. From a spatial perspective, the cumulative impacts analysis considers each Alabama project separately. This reflects the fact that each project's impacts are expected to be localized and without measurable spatial overlap with respect to the affected resources. The Gulf State Park Enhancement Project primarily affects terrestrial resources. The Swift Tract and Alabama Oyster projects both affect coastal marine resources but the projects are located on opposite sides of Mobile Bay, far enough apart that ecological interactions between them are unlikely to occur at a scale that results in measureable impacts. The geographic separation of these projects is reflected in Figure 11-24.

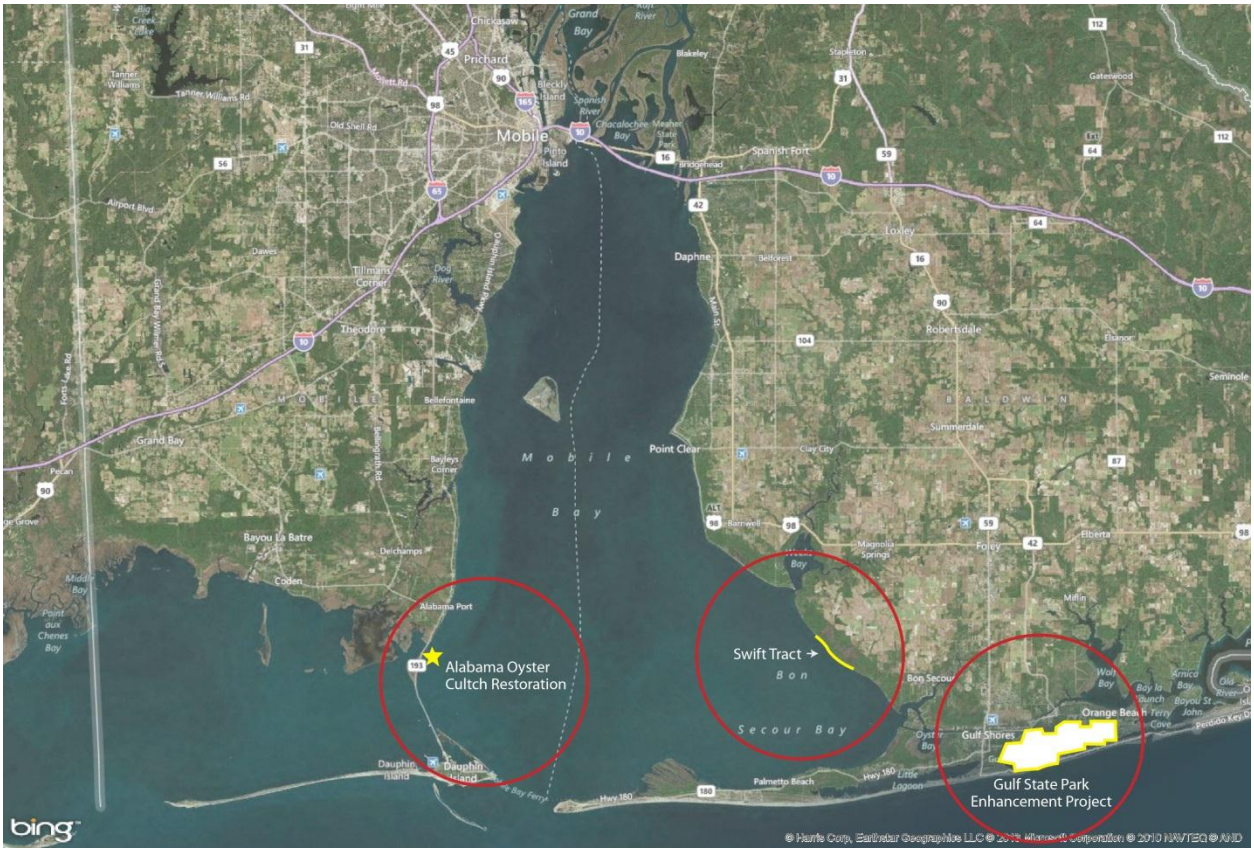

Figure 11-24. Alabama Project Locations

In developing the following cumulative impact analysis, the cumulative actions discussed in Chapter 6 were considered (e.g. marine transportation, oil and gas, etc.). As part of the cumulative analysis, past, present and reasonably foreseeable future actions were identified. This analysis considers the incremental contribution of proposed Phase III Early Restoration projects to potential cumulative impacts to resources discussed in Chapter 3. The analysis includes resources that are relevant to the concerns identified on the smaller regional scale.

For Alabama Phase III projects three spatial groupings were developed, one for each project, where past, present, and reasonably foreseeable future actions have, are, or could take place and result in cumulative impacts to the affected resource when combined with the impacts of the projects being considered.

Group 1: Swift Tract Living Shorelines Project

Group 2: Gulf State Park Enhancement Project

Group 3: Alabama Oyster Cultch Restoration Project

Table 11-33 summarizes the impacts to resources associated with proposed Alabama projects for all three groupings, comprising habitat, living coastal and marine resources, and recreational use projects. Each project grouping was evaluated to determine if it had any cumulative effects that, when combined with other past, present, and reasonably foreseeable actions in the geographic area surrounding each project, may result in cumulative effects to resources. 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.

Table 11-33. Summary of Impacts of Proposed Phase III Early Restoration Projects in Alabama.

	Geology and Substrates	Hydrology and Water Resources	Air Quality and GHGs	Noise	Living Coastal and Marine Resources	Protected Species	Wildlife and Vegetation (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
Group 1 Projects													
Swift Tract Living Shorelines	+	+	S	S	+	+	+	+	+	S	+	NE	+

	Geology and Substrates	Hydrology and Water Resources	Air Quality and GHGs	Noise	Living Coastal and Marine Resources	Protected Species	Wildlife and Vegetation (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
Group 2 Projects													
Gulf State Park Enhancement Project	S	+	+	S	+	+	S	+	NE	+	+	NE	+
Group 3 Projects													
Alabama Oyster Cultch Restoration Project	S	+	S	S	+	**NE**	+	+	**NE**	S	+	**NE**	**NE**

Adverse effect: -
Beneficial effect: +
S: Short term adverse effect
No effect: NE

11.10.1 Group 1: Swift Tract Living Shorelines

Ongoing and future activities that were evaluated in the cumulative impact analysis for the Swift Tract Living Shoreline project include primarily those restoration and development activities occurring in the vicinity of the project within the water or along the shoreline with the potential to impact resources along the shoreline or in the water. These activities include various restoration projects including living shorelines, land acquisition, mitigation banks and other restoration projects. Artificial reef projects in the vicinity of the proposed Swift Tract Living Shoreline project were also evaluated for the potential for cumulative impacts. In addition, other projects that could impact the area and result in some levels of disturbance include marine transportation and development, such as energy development projects.

The impact of these ongoing and future actions, overall, would be beneficial as the numerous projects that contribute to enhancing biological resources in the area (including living shorelines, mitigation banks, reef restoration and other restoration) would contribute to the ecological restoration and habitat enhancement in the area. Actions that include in-water disturbance (energy development) and marine transportation have the potential to result in long-term minor adverse impacts due to disturbance to the in-water habitat which could impact certain species, but would not have any impacts on the population level. Projects that require underwater trenching would result in a short-term impact from increased turbidity in the water and disturbance of the substrate, but these impacts would be short-term, and would no longer be present shortly after construction is concluded.

Overall, the cumulative impact of past, present, and reasonably foreseeable future actions related to the Swift Tract Living Shorelines project would result in beneficial impacts over the long-term, as restoration and environmental stewardship activities, artificial reef programs, and other restoration projects would all contribute to improving the natural environment, while as a secondary benefit providing increased habitat and improving the environment for recreational purposes. The Swift Tract Living Shorelines project would further these benefits by developing reefs that support benthic secondary productivity, including, but not limited to, bivalve mollusks, annelid worms, shrimp, and crabs. Similar to other ongoing and future actions, implementation of the Swift Tract Living Shorelines Project would result in short-term adverse impacts from disturbance during construction of the breakwaters that would no longer occur once the project is completed. Past projects that have required construction such as energy development and other coastal development would result in short-term adverse impacts during construction, but because these impacts are considered to be short-term and temporary and are no longer occurring, they do not contribute to the cumulative impact finding. Long-term adverse impacts from previous and future in-water development activities include loss of habitat and other impacts to the living coastal and marine resources. However, when the impacts of these past, present, and reasonably foreseeable future actions are combined with the impacts of the proposed Swift Tract Living Shorelines Project, cumulative impacts would be long-term minor adverse with respect to any loss of habitat, of which the impacts of the Swift Tract Living Shorelines project would provide a minimal contribution. There would also be beneficial cumulative impacts from restored natural resources to which the Swift Tract Living Shorelines project would contribute moderately.

Past, present, and reasonably foreseeable actions that have been considered as part of this analysis:

1. Three Nature Conservancy projects related to coastal restoration and living shorelines
2. Land acquisition in the vicinity of Swift Tract for the benefit of the public
3. Weeks Bay Mitigation Bank
4. Marine transportation actions include the Intra Coastal Water way and maintenance dredging
5. Natural gas production in the lower Mobile Bay
6. Alabama Inshore Artificial Reef Program
7. Alabama MRD Public Oyster Reef Management and Restoration Program
8. Artificial reef sites

11.10.2 Group 2: Gulf State Park Enhancement Project

Ongoing and future activities that were evaluated in the cumulative impact analysis for the Gulf State Park Enhancement Project include those related to restoration of the coastal environment such as beach nourishment, dune restoration, and artificial reef establishment, as well as development of the area for tourism and recreational uses.

The impact of these ongoing and future actions overall would be beneficial as they contribute to the ecological restoration and enhanced recreational opportunities in the area. Restoration-related projects provide additional habitat in the area for flora and fauna, as well as protect geological resources and soils and enhance the visual environment. During development of these prior restoration efforts, construction activities resulted in short-term adverse impacts from disturbance to natural resources, as well as visual, noise, and air impacts. However, these projects were small scale in nature and once construction was completed, the adverse impact concluded and did not continue into the future, resulting in an overall net benefit to these areas. Coastal development, land use, tourism, and recreation projects similarly resulted in short-term adverse impacts during construction, but long-term benefits from the provision of additional recreational amenities in the area. Some minor adverse impacts from these projects are long term including disturbance to wildlife and wildlife habitats; however ample habitat remains and the overall viability of species populations has not been impacted. These development projects have also resulted in long-term minor adverse impacts to traffic and transportation, noise, and air quality. For traffic and transportation the level of service on the roadway network surrounding Gulf State Park remains at an acceptable level of service resulting in minor impacts. Increases in noise and air emissions have resulted from this development, with the area remaining in compliance with applicable air and noise regulations, resulting in minor long-term impacts. Overall, these actions that contribute to ongoing and future actions would be both long-term beneficial and minor adverse

Overall, the cumulative impact of past, present, and reasonably foreseeable future actions related to the Gulf State Park Enhancement Project would result in beneficial impacts over the long-term, as restoration and environmental stewardship activities, artificial reef programs, and recreational enhancements such as the pier project all contribute to improving the natural and human environment. The Gulf State Park Enhancement Project would further these benefits by providing additional recreational use amenities, interpretive and educational opportunities, and ecosystem restoration through dune enhancement. Similar to the ongoing and future actions, implementation of the Gulf State Park Enhancement Project would require construction that would have short-term adverse impacts that would no longer occur once the project is constructed. Past projects that have required construction such as beach nourishment, the Perdido Pass navigation project, costal development, and pier construction resulted in short-term adverse impacts during construction, but these impacts are considered to be short-term and temporary and are no longer occurring and, therefore, do not contribute to the cumulative impact finding. Long-term adverse impacts from coastal development include loss of habitat and other impacts to the living coastal and marine resources, as well as increased

traffic in the area. However, when the impacts of these past, present, and reasonably foreseeable future actions are combined with the impacts of the proposed Gulf State Park Enhancement Project, cumulative impacts would be long-term minor adverse with respect to any loss of habitat, to which the impacts of the development aspects of the Gulf State Park Enhancement Project would minimally contribute. However the dune restoration component of the Gulf State Park Enhancement Project would have a moderate beneficial contribution to restoration efforts in the area. There would also be beneficial cumulative impacts from restored natural resources and enhanced recreational opportunities that provide beneficial impacts to socioeconomics, tourism, and recreational use to which the Gulf State Park Enhancement Project would be the primary contributor.

Past, present, and reasonably foreseeable actions that have been considered as part of this analysis:

1. Orange Beach, Gulf State Park, and Gulf Shores Beach Nourishment Project
2. ERP I – Dune Restoration Project
3. ERP II – Restoring the Night Sky
4. Perdido Pass Navigation Project
5. Coastal Development include the Amber Isle Development (Restaurant, Hotel and Surf Shop) and Phoenix West II Condominium
6. Alabama Artificial Reef System
7. City of Orange Beach Trail System

11.10.3 Group 3: Alabama Oyster Cultch Restoration Project

Ongoing and future activities that were evaluated in the cumulative impact analysis for the Alabama Oyster Cultch Restoration Project include primarily those restoration and development activities occurring in the vicinity of the project within the water or along the shoreline with the potential to impact resources along the shoreline or in the water. These activities include various restoration projects including living shorelines, land acquisition, and previous Early Restoration projects. Artificial reef and oyster reef restoration projects in the vicinity of the proposed Alabama Oyster Cultch Restoration Project were also evaluated for the potential for cumulative impacts. In addition, other projects that could impact the area and result in some levels of disturbance include marine transportation and development, such as utility extensions and energy development projects, as well as ongoing recreation in the area and providing additional recreation from renovated boat ramps.

The impact of these ongoing and future actions, overall, would be beneficial as the numerous projects that contribute to enhancing biological resources in the area (including living shorelines, oyster reef restoration and other restoration) would contribute to the ecological restoration and habitat enhancement in the area. Actions that include in-water disturbance (such as utility and energy development), marine transportation, or providing additional recreational amenities have the potential to result in long-term minor adverse impacts due to the disturbance to the in-water habitat which could impact certain species, but would not have any impacts on the population level. Projects that require underwater trenching would result in a short-term impact from increased turbidity in the water and disturbance of the substrate, but these impacts would be short-term, and would no longer be present shortly after construction is concluded.

Overall, the cumulative impact of past, present, and reasonably foreseeable future actions related to the Alabama Oyster Cultch Restoration Project would result in beneficial impacts over the long-term, as restoration and environmental stewardship activities, artificial reef programs, and other restoration projects would all contribute to improving the natural environment, while as a secondary benefit providing increased opportunities for oyster harvesting and improving the environment for recreational purposes. The Alabama Oyster Cultch Restoration Project would further these benefits by providing additional habitat for oysters, as well as other species that utilize the area, and further increasing oyster harvesting opportunities. Similar to the ongoing and future actions, implementation of the Alabama Oyster Cultch Restoration Project would result in short-term adverse impacts from disturbance during cultch placement that would no longer occur once the project is completed. Past projects that have required construction such as energy development and other coastal development resulted in short-term adverse impacts during construction, but because these impacts are considered to be short-term and temporary and are no longer occurring, they do not contribute to the cumulative impact finding. Long-term adverse impacts from previous and future in-water development activities include loss of habitat and other impacts to the living coastal and marine resources, as well as increased traffic in the area from additional commercial and recreational opportunities. However, when the impacts of these past, present, and reasonably foreseeable future actions are combined with the impacts of the proposed

Alabama Oyster Cultch Restoration Project, cumulative impacts would be long-term minor adverse with respect to any loss of habitat, of which the impacts of the Alabama Oyster Cultch Restoration Project would contribute minimally. There would also be beneficial cumulative impacts from restored natural resources and enhanced commercial and recreational opportunities that provide beneficial impacts to marine habitats, socioeconomics, tourism, and recreational use to which the Alabama Oyster Cultch Restoration Project would contribute moderately.

List of past, present, and reasonably foreseeable actions that have been considered as part of this analysis:

1. The Nature Conservancy Coffee Island/Alabama Port Living Shorelines Project
2. FERP I Marsh Island Restoration Project
3. ADCNR Little Bay Restoration Project
4. Alabama Forever Wild Portersville Bay Wetlands Acquisition
5. Marine transportation related actions include the Intra Coastal Waterway and Mobile Harbor Navigation Project
6. Natural Gas Production in the Lower Mobile Bay
7. Coden Sewer Line Extension CIAP Project
8. Southeastern Mobile County Sewer Infrastructure CIAP Project
9. AL MRD Activities including the Inshore Artificial Reef Program, Public Oyster Management and Restoration Program
10. AUMERC Portersville Bay Oyster Aquaculture Program
11. Heron Bay Cutoff Boat Ramp Renovation CIAP Project

In addition to foreseeable actions identified for the three projects above, in November 2013, 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 Alabama:

- Restoration & Enhancement of Oyster Reefs in Alabama
- D'Olive Watershed Restoration
- Fowl River Watershed Restoration

The NFWF projects were recently announced. The Trustees will consider the implications of these projects as they relate to the assessment of the potential cumulative impacts of the proposed Phase III actions in Alabama. As part of the comments on this Draft ERP III/PEIS, the public is invited to comment on how the proposed projects may contribute to cumulative impacts.